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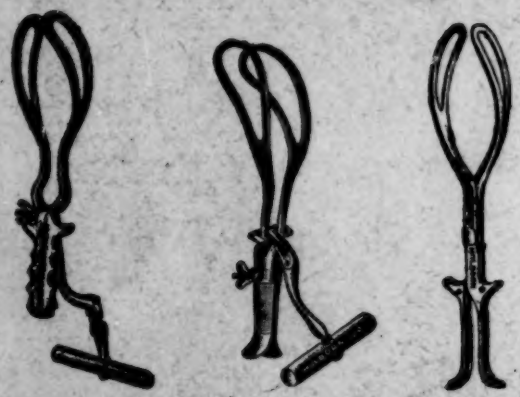

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BRITISH MEDICAL JOURNAL

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THE NEWER APPROACH TO IMMUNITY IN ITS BEARING ON MEDICINE AND BIOLOGY*

BY

Sir MACFARLANE BURNET, M.D., Sc.D., Ph.D., F.R.C.P., F.R.S.

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In recent years my primary interest has been in the behaviour of viruses, but from the very beginning of my scientific work the nature and significance of immunity has been a necessary and abiding interest. Immunity, however, is to-day a rather unfashionable topic in comparison, for example, with adrenal hormones or viruses, but I believe that it might be of interest and perhaps even of value to speak of the modern approach to immunity in its bearing particularly on medical problems. For the most part I shall speak in rather general terms, and I cannot avoid introducing some consideration of immunity as a general biological phenomenon. Some may feel that such a discussion of immunity might have been more appropriate forty to fifty years ago in the great days of Ehrlich, Bordet, and Almroth Wright. On the contrary, I should like to show that new facets are emerging that may modify importantly the understanding of several types of human ills.

The Biological Approach

Immunity from one point of view is so advantageous a physiological attribute that one might almost say from the biological angle that its existence is self-explanatory. In a world that is full of micro-organisms capable of infecting living tissues, it is a positive necessity for survival that most experiences of infection by any given microbe should be followed first by recovery and secondly by a persisting insusceptibility to an attack of the same disease. On other occasions I have given reasons for thinking that perhaps the important factor in the development of the particular types of immune reaction with which we are familiar in man was the evolution of his mammalian ancestors for the most part as relatively solitary arboreal animals in tropical jungles. In such environments it seems likely that the major type of pathogen that would be encountered would be those protozoa and viruses spread by insect—especially mosquito—vectors. It is not improbable that the type of immunity characteristic of human beings is essentially something evolved to deal effectively with infection by mosquito-borne viruses of the yellow-fever type.

They may represent an unnecessary refinement, but at least we can be sure that immunity is a mechanism that has been evolved to deal with the entry of foreign micro-organisms into the body, and that it has been perfected by the normal process of selective survival.

Medical immunology, however, deals with a wider range of phenomena than those concerned simply with immunity to infectious disease. With the modern development of blood transfusion as a therapeutic measure, a very important set of new clinical conditions has been uncovered—conditions in which the immune mechanism has been constrained by circumstances to give rise to a harmful or fatal set of reactions. I am concerned here mainly with the significance of conditions in which this abnormal or harmful functioning of the immunity mechanism occurs, and I should at once like to introduce the two central concepts of *antibody*, its nature and production on the one hand, and of the contrast between *self and not-self* on the other. These are basic to any understanding of immunity.

A Concept of Antibody

The nature of antibody is now reasonably familiar to everyone with some knowledge of medicine or biology, but there are still many aspects of the nature and production of antibodies that are obscure. Simplifying the situation so far as is legitimate, we can describe antibody as a modified soluble protein (present in highest concentration in the blood), the individual molecules of which have properties causing them to stick firmly to those types of molecules or micro-organisms against which the antibody was developed. When a patient is convalescent from an attack of yellow fever we may find that as much as 1 to 2% of the serum protein is yellow-fever antibody. The amount will fall gradually, but in most instances quite significant quantities will be present throughout the whole subsequent life of the individual, and this antibody is the agent responsible for his concomitant immunity against yellow fever. If yellow-fever virus re-enters the body as a result of the bite of a mosquito carrying the virus, the virus particles are immediately coated with the specifically patterned antibody molecules, whose presence effectively prevents the virus from initiating an attack of disease.

Whenever foreign organic material enters the body tissues—in the vast majority of natural instances as a result of invasion by one or other pathogenic micro-organisms—processes are set in motion which have been evolved to rid the body of the foreign element and to ensure that effective invasion by the same type of alien

*The fifth Frederick Price Lecture, delivered at the Royal College of Physicians, Edinburgh, May 3, 1954.

will not occur again. The essential feature is that the cells producing the serum protein gamma globulin change the pattern of the molecules to the extent that is required to allow their specific attachment to micro-organisms of the infecting type. Much work has been done on the physical nature of antibodies and on the cells responsible for their production, but from our present point of view the essential point to recognize is that blood proteins can be produced in a probably unlimited number of *patterns* without more than trivial changes in their physical qualities.

This characteristic reaction to the entry of foreign organic material is apparently the responsibility of that system of mesenchymal cells, including reticulo-endothelial cells, lymphocytes, and plasma cells, which is conspicuous in spleen and lymph nodes and may be conveniently referred to as the scavenging cells of the body. But here we come on a very important difficulty. This is that the cells which deal with foreign organic material are the same cells that are concerned with the disposal of damaged and effete body cells. It is well known that approximately 1% of our red cells are taken from the circulation and broken down in spleen macrophages and elsewhere each day. A corresponding new production keeps the system in equilibrium. Lymphocytes seem to have a very rapid rate of turnover, and probably most cells other than those of the central nervous system are replaced at longer or shorter intervals. It is clearly important that the removal of worn-out erythrocytes or other body cells should *not* provoke an antibody response.

From the literature on transfusion reactions and on haemolytic disease of the newborn we know very clearly what may happen if red cells do provoke an antibody response. If by artificial or natural processes alien red cells enter the organism, antibody production may occur and highly undesirable results ensue. There are several other types of evidence to show that the expendable cells of the body will be treated essentially like foreign micro-organisms if they are inoculated into other species or into genetically dissimilar individuals of the same species. In their own body, of course, they are tolerated and finally disposed of without any immunological response.

"Self" and "Not-self"

The essence of the problem can now be stated. How do the scavenging cells that are responsible for dealing both with bacteria and other foreign organic material on the one hand, and with the body's worn-out expendable cells on the other, distinguish between the two groups, between what is "self" and what is "not-self." The fact that foreign material is eliminated or destroyed *with* antibody production while effete cells of the body's own pattern are broken down *without* antibody production must mean that in one way or another the scavenging cells can *recognize* whether the material they are dealing with is of the body's own pattern or something else, that they can recognize the difference between self and not-self. Such a statement might well be regarded as merely a truism incapable of verification or elaboration by experimental methods. If the capacity to recognize self-structure were built into the body wholly by the processes of inheritance and development then there would be very little more to say. On the other hand, if this recognition of self and not-self is "learnt," as it were, during the process of embryonic development, there are implications which can be observed or experimentally tested.

In our monograph on the production of antibodies (Burnet and Fenner, 1949) we pointed out that there were two sets of natural phenomena which were strongly in favour of the second alternative—that recognition of material as self is something that needs to be learnt and is not an inherent genetic quality of the organism. The first came from the study of the blood groups of cattle by Irwin and others at the University of Wisconsin. Cattle do not possess blood groups equivalent to the ABO human groups, but by appropriate iso-immunization procedures the existence of several genetically determined types can be demonstrated. With a set of properly produced and differentially absorbed antisera any sample of bovine red cells can be typed. The procedure is often of practical value in cases where the paternity of a calf is in doubt.

The normal rules of inheritance of blood groups, however, appeared to break down when twin calves were concerned. If the twins were non-identical, derived from two separate fertilized ova, it was common to find that both had two blood groups, perhaps 60% of the red cells being of one type and 40% of another. This character persisted through life. The probable explanation is that the two embryos, differing from one another in various details of their inheritance, developed a common placental circulation early in embryonic life. Suppose we assume that one has cells of blood group P, the other of group Q, the difference being genetically determined so that we can speak of one embryo as of P type and the other Q. The common circulation will ensure that many cells, including haematoblasts of P type, will pass into and lodge in Q, and vice versa. In all probability there are other and perhaps more subtle interchanges of antigenic patterns between the two, but we can concentrate simply on the blood cells. If P cells lodged in an animal genetically Q during adult life they would be recognized as foreign, and as part of the process of their removal antibody would be formed. But when this happens in embryonic life, not only are the foreign stem cells accepted but a tolerance is developed which allows their retention and the continuing production of descendant red cells of the "wrong" genetic type. It seems from this that if a foreign organic pattern is introduced at the appropriate stage of development, and if it persists in large enough amounts and for the necessary period of time, it may be accepted as "self." The mechanism for the recognition of self seems to be laid down, at least in cattle, at some period before birth.

Our second example came from a virus disease of mice, lymphocytic choriomeningitis (L.C.M.) which was studied extensively by Traub (1936, 1938, 1939) at the Rockefeller Institute. He followed the development of infection in a mouse colony over these years and ended up with a population almost literally saturated with the virus. Infection took place *in utero*, and, although there were deaths of embryos, many were born apparently healthy, and in these the virus persisted through life. None of these developed antibody; neither neutralizing nor complement-fixation reactions could be demonstrated in their sera. Relatively large amounts of virus could be extracted from any organ. L.C.M. virus injected into normal mice provokes disease of variable intensity and a rather low-grade immunity in which complement-fixing antibodies are demonstrable but not neutralizing ones. With recovery the virus is eliminated from the body. Here again we see a condition in which a persisting foreign entity introduced in embryonic life induces a tolerance to its presence which persists through development and adult life.

Since we published the monograph, another example of great interest has been observed by Dunsford *et al.* (1953). This concerns a woman blood donor of 25 whose blood was found to contain nearly equal amounts of A and O cells. By separating the two types of cell it could be shown that they also differed in respect of two minor antigens as well. The only reasonable inference was that the woman in question had a twin and that the two placental circulations had fused during foetal life. The foreign haematoblasts had been implanted, and, as in the bovine twins, they and their descendants had persisted. It is recorded that when the donor was asked whether she was a twin she

replied in some surprise that she was, but that her twin brother had died at the age of 3 months, 25 years before.

Here, then, are three observations of natural occurrences that point to the likelihood that foreign organic pattern introduced during embryonic life and persisting thereafter can be accepted by the body as if it were "self" material. Last year a direct experimental attack on the analogous problem of skin-grafting by a group headed by Medawar gave strong evidence in support of this conclusion. It is well known to every surgeon that skin grafts, if they are to take, must be from some area of skin on the patient himself. Homografts from another person persist for a few days only before provoking an immune reaction that leads to their rejection and necrosis.

In experimental skin-grafting in mice, however, there are possibilities beyond anything in human surgery. When a closely inbred homozygous strain of mice is available, transfer of skin from one individual to another is possible owing to the genetic uniformity of the strain. Skin from any other strain of mice is rejected just as human homografts are.

In Billingham, Brent, and Medawar's work (1953) three genetically uniform strains of mice were used which may be called A, B, and C. Pregnant females of A were taken about one week before term and each embryo was injected *in utero* with an emulsion of spleen and kidney cells of mice of strain B. Most of the young concerned were born alive, and, when 4 to 6 weeks old, were tested for their capacity to accept grafts of skin from A, B, and C mice. Untreated A mice of the same age were similarly tested as controls. The results were clear-cut in showing that the mice treated *in utero*, unlike the normal controls, accepted the heterologous B graft without immune reaction. This acquired *tolerance* was specific.

If instead of inoculating mice *in utero* they are injected with heterologous cells or grafted with heterologous skin in adult life, subsequent grafts of the same heterologous skin are rejected much more rapidly. This accelerated reaction represents an acquired and specific *intolerance* of the foreign cells. We have in the mouse, therefore, the interesting situation that, before a certain point in development approximately at the time of birth, the entry of foreign cells provokes a specific *tolerance* in later life, while after that point a similar entry gives rise to specific intolerance (or immunity). Probably this holds for other mammals as well as for the mouse, though it does not necessarily follow that the critical point of development is the same for each species. In fact, there is some positive evidence for animals such as guinea-pigs and sheep, which reach a high stage of development *in utero*, that immune reactions can be provoked before birth. In man the critical point is perhaps one to two months before birth, but there is as yet no direct evidence on the matter.

The Nature of Antibody Production

Any theory of antibody production has nowadays to do more than present hypotheses of how antibodies are produced in adult life. It must also take note of the existence of this critical point before which foreign material provokes a specific inability to produce the corresponding antibody in later life. In what has been called the self-marker hypothesis, Fenner and I made an attempt to do this (Burnet and Fenner, 1949). The following outline presents the essentials of this attempt.

The "scavenger" cells of the reticulo-endothelial system are assumed to contain subcellular structures which are or can be developed into "recognition units." These correspond to a fairly limited range of "self-markers," protein or polysaccharide configurations typical of the expendable cells of the body. As in other fields of biochemistry, recognition means simply the existence of a complementary pattern relationship between two complex chemical structures. Ehrlich introduced the simile of a lock-and-key relationship for the antigen–antibody reaction, and we must ascribe some similar relationship to enzyme and substrate or hormone and target substance. So in the present instance, when specific contact is made between self-marker and recognition unit, the process of disintegrating and disposing the material is set going along the path of tolerance without antibody production. By the time the critical point of development has been reached these recognition units have been laid down and moulded to the self-markers of expendable body cells and to any equivalent foreign patterns that may have been present by some accident of infection, development, or experimental device. Once the critical point is passed no subsequent modification of recognition units can occur.

A new type of response now becomes the rule. On the self-marker hypothesis, antigens—those substances capable of provoking antibody production—are molecular patterns differing from any of those of the body's self-markers but having sufficient resemblance to be capable of partial reaction with one or other of the recognition units of the scavenging cells into which they may find their way. Partial reaction leads to active modification of the recognition unit pattern so that it will be complementary to the antigen, but a new feature emerges. The reshaping of the unit so that it will "recognize" the specific antigen sets in train a process almost equivalent to the entry of a virus into the cell. The modified recognition units multiply, reproducing their new specific pattern and allowing their transfer to the stem cells of the lymphoid series, which can, as it were, act as foster parents for the modified units.

In these stem cells the pattern persists as an inheritable character, sometimes for life, though probably in all cases there is a slower or faster drift back toward the normal pattern complementary to one of the self-markers. Under a new antigenic stimulus of the same type the stem *cells produce descendant cells specialized* to produce incomplete copies of the modified recognition units and liberate them in large numbers into the blood as antibody molecules. The cells responsible for such active production are necessarily in a state of active protein synthesis. They are the immature plasma cells of the histologist characterized by the pyronine staining of cytoplasm and nucleolus which is indicative of protein synthesis. As the antigenic stimulus wanes, antibody production continues, though on a lower level, and the cells involved in the later stages are almost certainly lymphocytes. There is still controversy on the matter, but it seems legitimate to regard the primary function of the lymphocytes as the production, transport, and liberation of antibody.

By the use of appropriate radio isotopes it can be shown that antibody, like other blood proteins, is constantly being used up and renewed. The "half life" of antibody is about 14 days in man, less in the small laboratory animals. It is a sound rule, therefore, that so long as any antibody is detectable in the blood it is still being actively produced. For any long-lasting immunity we must therefore postulate a perpetual growth and replication of the cells in which the modified pattern is stored and a constant production and breakdown of the lymphocytes that are the actual producers of antibody.

This outline of the self-marker theory of antibody production is condensed and perhaps difficult to follow. It is also a theory that is by no means acceptable to many immunologists. We can still claim, however, that it is as yet the only one which attempts to face the implications of acquired specific tolerance, and, as I hope to show, it has some important ideas to offer for clinical medicine.

Pattern in Biology

Perhaps it would not be out of place to introduce here a parenthesis, as it were, on the significance of pattern in biological reactions. My own interests have been in the field of antibodies, viruses, enzymes, and genes, all potent agents of specific pattern, but now, and perhaps indefinitely, beyond the scope of classical organic and physical chemistry. Perhaps an alternative approach is beginning to open out in the concept of organic pattern as a carrier of "information" or "instructions" from one part of the

organism or the cell to another—a communication theory, as it were, of the living organism. Such a theory has not yet been developed, although Delbrück recently made some important suggestions in this direction about nucleic acids. In our particular instance we can restate the position somewhat as follows. The pattern of foreign cells entering the body before the critical point establishes an information mechanism and a set of instructions on how to deal with such information when it is subsequently received. After the critical point, the same type of information will convey very different instructions.

It is orthodox to regard the aim of the biological sciences as to express phenomena in terms that become progressively more and more those of classical chemistry and physics. It may be more realistic to believe that an approach in terms of the replication of organic pattern, and of a developing communications theory of the organism, may be adequate to allow the full utilization of all the potentialities of controlling biological processes.

Clinical Applications

This, then, is a theoretical picture of the biological significance of antibody production as it appears at the present time. It will be noted that I have said very little about what I have described as the primary function of antibody production—protection against infectious disease. This is simply because I am primarily interested in the newer approach to immunology with its emphasis on the self-not-self relationships.

Similarly, in the concluding sections of this lecture which deal with some of the clinical implications of immunity, I shall say nothing in regard to infectious disease in the ordinary sense. The three topics that I shall briefly discuss in the light of the previous theoretical approach are tissue transplantation, serum hepatitis, and the possible part played by auto-antibodies, so-called, in disease.

Tissue Transplantation

The experiments by Billingham and Medawar that I have mentioned lead naturally to the problems of organ-grafting in surgery, either to repair physical damage as in skin and bone grafting, or with the objective of providing a functioning source of hormone after the usual producer has been eliminated by disease or surgery. So far as one can attempt a generalization from the not always consistent literature, attempts to graft expendable vascularized tissues will succeed only when the grafts are autologous or come from an identical twin of the subject receiving the graft. All plastic surgeons now accept the inevitability of a foreign skin graft failing to "take." At most it can provide a transient "dressing" in the period before the immunological response induces its rejection. In the same way, bone and arterial grafts provide only frameworks on which the recipient's own cells can eventually build up new tissues of the body's own kind.

The interesting possibilities at the present time centre in the cornea and some of the endocrine tissues. Corneal grafting is an accepted surgical procedure and is often successful. I have not been in a position to gain any wide acquaintance with the literature or any experience in this field, but one gathers that the important requirement for success is that union should take place between the non-vascular tissues without the development of new inflammatory vascularization. It seems that foreign tissue can be tolerated if it is not, as it were, brought to the notice of the body. The immunological situation of the tissues of the eye may be more subtle than this. The older literature indicates, for instance, that the lens has none of the normal "self-markers" of the other body tissues, and a thoroughgoing immunological analysis of the antigenicity of eye tissues and of the reaction of other antigens introduced into the eye might be a very rewarding study at the present time.

Endocrine transplants have been attempted for many years, often with apparent success. At the experimental level I am most familiar with the work of Woodruff and Woodruff (1950) on the transplantation of guinea-pig thyroid to the anterior chamber of the eye in other individuals of the same species. There are two outstanding points that emerge from this work. The first is that the graft survives only when there is a positive need for thyroid tissue—that is, in thyroidectomized recipients only. The second is that in a successful take there is a phase of almost complete histological disorganization of the tissue which may well be interpretable as a replacement of the interstitial tissues (expendable cells) by cells of the recipient, with subsequent reorganization of the needed thyroid cells within the stroma provided by the new host. Simply as a working hypothesis it would seem reasonable to believe that there are cells of the body which are not expendable in the usual sense of the word: if they decrease in number their disappearance is mediated by some mechanism other than the action of the scavenger cells. For these cells different rules may apply; they flourish or dwindle in response to the hormonal balance of the body. I do not want to elaborate these ideas—they are no more than indications of the way in which the basic idea of the differentiation between self and not-self can be applied to the understanding of problems of practical importance.

Serum Hepatitis

There may be phenomena of clinical importance that are related to the pre-natal phase in which the reciprocal patterns of self-markers and recognition units are adjusted. The very rare existence of two blood groups in a person who was born as one of a non-identical twin pair has been mentioned. A region where similar phenomena may be at work is in regard to the origin of serum hepatitis, perhaps the most puzzling and important of all to-day's virus diseases. It is puzzling precisely because it has no natural history and its importance to the clinician is obvious. It is not right that we should have to undertake life-saving measures like blood transfusion always with the fear that with the blood we may be giving a disease that two to three months later may provoke serious or fatal illness. As a virologist I think that nothing could make me happier than to discover a practical means of determining whether or not a given sample of blood or serum contained the virus of hepatitis.

The nearest relative of serum hepatitis (S.H.) virus is clearly the virus of infectious hepatitis (I.H.), which differs from S.H. virus, (*a*) in having a shorter (30 days) incubation period, and (*b*) in being immunologically distinguishable in tests on human volunteers. I do not know any way in which a differential diagnosis can be made on purely clinical grounds. If we are dealing with a virus, as I think we must accept, then we have to find some way in which a reasonable explanation of the presence of the S.H. virus in one person's blood and not in another's can be given. In the absence of any test for the virus, other than human inoculation, facts on which to base any speculation are few and unsystematic. There are one or two cases in which a given donor has been shown to carry the virus for years (3 years at least in one instance: Stokes *et al.*, 1954), and cases of congenital hepatitis in newborn infants are on record. On this very slender evidence we may consider the possibility that serum hepatitis is a variant of infectious hepatitis with two special qualities—(*a*) it has a diminished antigenicity so that it does not provoke antibody against I.H. virus and is not influenced significantly by I.H. antibody. The question of whether it can in some people provoke effective antibody against S.H. virus itself is not yet clear; and (*b*) in some instances S.H. virus infects the foetus *in utero* without gross damage in most instances, and such infants may become lifelong carriers of the virus in a fashion analogous to Traub's mice with L.C.M. virus infection.

This hypothesis must remain a sterile one until some laboratory test is available for the S.H. virus. I am still optimistic that such a test will eventually become available, and as soon as it does the hypothesis of uterine transmission

will become susceptible to test. In that sense at least it is a legitimate working hypothesis. Until then its only virtue is that it does provide a possible account of the survival of the virus in nature that is in reasonable accord with the available facts.

Auto-antibodies in Relation to Disease

Almost since the first recognition of allergic disease, there have been speculations about the possible role of antibodies produced against some of the body's own tissues as agents of chronic disease. The loose group of rheumatic diseases, especially rheumatic fever and acute nephritis, have been particularly considered from this point of view. In general, speculation has taken the form that a micro-organismal product reacts with some body component modifying its antigenicity (or, in our terminology, changing one of its self-markers) so that it provokes antibody production. The reaction of this antibody with either the modified or the unmodified body component results in localized damage in certain organs.

It is probably correct to say that there is no decisive evidence against this type of hypothesis but equally no direct evidence in its favour. When anyone can demonstrate a well-defined circulating antibody of the type postulated in every case of rheumatic fever tested at the appropriate period, then there will be a real opportunity for investigation.

Some of the findings that provide indications for the reality of such disease processes may be mentioned briefly.

(1) Perhaps the most important is the occurrence of acute allergic encephalomyelitis in monkeys and other animals when they are inoculated with emulsions of nerve tissue plus adjuvants in the form of killed tubercle bacilli, paraffin, and an emulsifying agent. Even homologous nerve tissue will serve, and one must postulate damaging interaction of actively produced antibody with a normal component of the body. It will be of particular interest to find whether this potential antigenicity belongs only to some components of non-expendable cells not directly concerned in the self-not-self recognition mechanism.

(2) Anti-organ sera, for example, against lymphocytes or kidney tissue produced in another species and injected into the species supplying the antigen can produce well-marked pathological changes resembling those for which auto-antibodies are postulated. This, however, is only indirect evidence, since another species produces the antibody.

(3) There are large numbers of skin-sensitizing agents—formalin, picryl chloride, etc.—which in some animals or individuals appear to combine with body proteins to give new specific antigens regarded as foreign by the body. There is some evidence that the specificity of the new antigen includes an element of specificity for the tissue involved. In guinea-pigs sensitized by painting with picryl chloride the sensitivity can be much better demonstrated in the skin than elsewhere. This supports the suggestion that if a body component is changed so as to become antigenic the antibody produced may react to some extent with the normal component.

(4) In at least one instance the action of a virus on a mammalian cell produces or uncovers a new antigen. Human red cells treated with influenza virus or an equivalent enzyme are agglutinated by a natural agglutinin without action on normal cells and provoke a new specific antibody when injected into rabbits. So far this has not been shown to have any bearing on pathological conditions associated with influenza, but again it offers a model of what might result from virus action on appropriate cells.

Conclusion

The main function of any lecture of this type must be to attempt a summary of current knowledge in such a fashion as may provide a stimulus to thought or action in those not directly and professionally involved in the study of the chosen subject. I am very much aware that I have adopted a highly theoretical approach and that where I have touched on clinical matters it has been merely to propose a set of questions and speculations. I have provided nothing that will answer any problem of diagnosis or treatment, but I do hope that in what I have said there is a germ of something that may, in time, become important to medicine. In recent years I have become increasingly convinced of the importance of finding new approaches to the science and art of medicine. We have been wonderfully successful in dealing with infectious disease and with traumatic and mechanical injury or disability, but the deeper problems of inherited weakness and chronic functional disease have, on the whole, been approached only in superficial fashion. Advance in those fields will come from two directions : on the one hand, from an understanding of the impact of the human environment, the psycho-social impact on the functioning of the body, and, on the other hand, from a deeper understanding of the processes of inheritance and development—that sequence of replications and interactions among patterned macromolecules—one aspect of which is illustrated by the immunological phenomena with which I have been concerned.

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BONE MARROW*

BY

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In this lecture I propose to give a short account of the quantitative studies of the bone-marrow cells, upon which my colleagues and I have been engaged for the past few years. Since our attention was first directed to the bone marrow by our studies on lymphocyte production, a brief review of these earlier studies may not be out of place, both as an introduction to our bone-marrow work and as an indication of the way in which our ideas have developed.

Lymphocyte Production

Lymphocytes are being continually produced in the lymphoid tissues and thence entering the blood stream. They may obtain access to the blood either indirectly by first of all entering the lymph, in which they are finally discharged into the blood through the thoracic and right lymph ducts, or they may reach the blood directly by passing through the endothelium of the blood capillaries in lymphoid tissue. It is probable that the overwhelming majority of the lymphocytes reach the blood indirectly via the lymph stream, for in the few experiments in which complete lymphatic obstruction has been brought about (Blalock *et al.*, 1937) the blood lymphocytes fall practically to zero. If the lymphocytes were entering the blood directly in large numbers, one would not expect this to be the case. At any rate, whatever may be the number of lymphocytes which enter the blood stream directly, we have no simple way of measuring them. The lymph-borne lymphocytes, on the other hand, can be readily estimated by cannulating the thoracic and right lymph ducts, immediately before they enter the blood. In actual practice, it should be added, most observers have cannulated the thoracic duct only.

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Blood Lymphocyte Replacement

After collecting thoracic duct lymphocytes in this way, one can make some relatively simple calculations, and, by comparing the numbers entering the blood with those already in it, one arrives at the conclusion that lymphocytes are entering the blood in numbers sufficient to replace those already in it somewhere between two and four times daily. The extent of this daily replacement—or, as we termed it, the daily replacement factor (D.R.F.)—appears to vary somewhat in different animals. In the dog, and presumably in man, the D.R.F. seems to be somewhere around 2 (Yoffey, 1932–3, 1935–6), whereas in the cat and the rabbit it seems to be of the order of 3–5 (Sanders *et al.*, 1940). However, lest this might appear to lead to too facile a generalization about increase in the D.R.F. in smaller animals, it should be noted that Reinhardt (1946) found in the rat a D.R.F. of 2.05.

It should perhaps be emphasized at this point that these lymphocytes which are entering the blood through the thoracic and right lymph ducts are in fact newly formed cells, and not merely the result of a continuous recirculation of lymphocytes between blood and lymph. One of our earlier papers (Yoffey and Drinker, 1939) dealt specifically with this aspect of the problem. If lymph is collected before it has passed through any lymph nodes—we refer to this as *peripheral lymph*—it contains very few lymphocytes, whereas after it has passed through one or more nodes it contains many of these cells. This finding seems to argue quite definitely against a circulation of lymphocytes on any but the smallest scale, though it is just conceivable that such a circulation may still take place actually in the substance of lymphoid tissue. In other words, a lymph node could be a structure not in which lymphocytes are formed but in which they are passing from blood to lymph. This view has been put forward (Sjövall, 1936; Fichtelius, 1953) despite the fact that lymphoid tissue shows definite evidence of cell multiplication in the numerous mitoses which occur both in the germinal centres and elsewhere.

On the whole, the evidence seems definitely to be opposed to the idea of a lymphocyte circulation, and one is thus left with the problem: What happens to the large numbers of lymphocytes which constantly enter the blood, remain in it for a matter of hours, and then leave it?

Fate of the Blood Lymphocyte

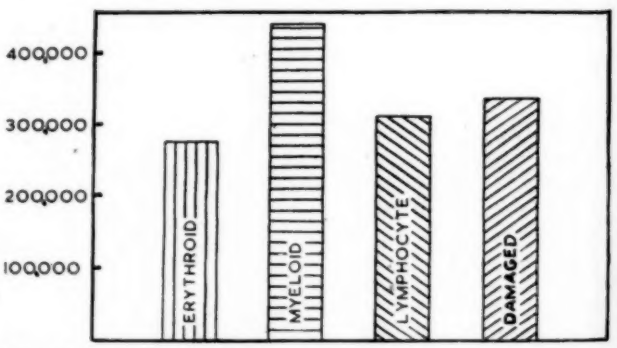
There is no convincing evidence that lymphocytes are destroyed in any appreciable numbers while in the blood (Bunting and Huston, 1921). The available evidence seems to indicate, in fact, that lymphocytes possess a viability of at least several days, while a large number of observers have claimed that they can grow and develop into other cells, though it must be admitted that on this point the literature contains conflicting reports. Of the various other explanations which have been advanced to account for the disappearance of lymphocytes from the blood, the two which have been most consistently advocated are (*a*) that they are being continually filtered out into the bone marrow, to act as stem cells for the myeloid and erythroid series—for example, Jordan (1939); and (*b*) that they are eliminated by passing through the intestinal mucous membrane.

So far as intestinal elimination was concerned the evidence on the whole also appeared to be unsatisfactory—for example, Jassinowsky (1925)—and so we decided to concentrate on the bone marrow. The first problem was to obtain quantitative data about the bone-marrow lymphocytes, and to find out whether the numbers involved were sufficient to warrant further investigation. This necessitated devising a quantitative technique for the estimation of the nucleated cells of the bone marrow. The vast literature of clinical haematology so far as it related to bone marrow was virtually useless, since it is based for the greater part on sternal punctures in which blood and marrow are aspirated in varying proportions so that no reliable quantitative study is possible.

Quantitative Estimation of Marrow Lymphocytes

Our first attempts at the quantitative study of bone marrow were made with rabbit marrow (Yoffey and Parnell, 1944), following up some earlier observations by Gordon (1939) in man. The basic principle of the technique is to obtain a known weight of marrow in a known weight of some diluent, preferably autogenous serum, and then by mechanical agitation to disrupt the marrow so that its individual cells become freely suspended in the serum. This suspension of cells can be counted in the usual manner, while from it smears can be made and stained for the purpose of differential counts. The specific gravity of red marrow is very close to 1.0 (Mechanik, 1926), as also is that of serum or plasma, and in our earlier work, for the purposes of calculation, weight was directly converted to volume on the assumption that the specific gravity was in fact 1.0.

In later work the technique has undergone several modifications. Originally we attempted to break up the bone marrow by teasing it in serum in a watch-glass, but this was quickly found to be unsatisfactory because of evaporation. Further, the bone marrow of the rabbit was found to be somewhat "stringy" and difficult to disintegrate. After numerous efforts we finally selected the humerus of the young guinea-pig, weighing approximately 400 g., a weight to which for purposes of comparison all our calculations were finally adjusted. A small glass tube is weighed. Under ether anaesthesia the abdomen is opened, the aorta incised, and the blood collected into centrifuge tubes. It is important to bleed the animal in this way, not only to obtain autogenous serum but also by exsanguination to drain away from the marrow as much blood as possible. The blood is rapidly centrifuged, after which the corked tube is about half filled with serum and then weighed again. Meanwhile a humerus is removed, cleaned, and the ends sawn off with a small fretsaw. By means of a blower at one end the marrow is ejected into the serum-containing tube, which is then weighed a third time. We thus have a known weight of bone marrow in a known weight of serum. The tube is then shaken for two to three minutes in a mechanical shaker—amplitude 5 in.—at 400 times a minute, and usually this results in complete disintegration of the marrow with a uniform suspension of cells. As a further refinement we now, from the specific gravity of the serum and of the cell suspension, calculate



Normal myelogram. Absolute counts per c.mm. of marrow of 17 normal guinea-pigs. Mean of 34 observations (Harris *et al.*, 1954).

the specific gravity and volume of the marrow, and so obtain a true volume dilution of marrow in serum.

Compared with the smears normally seen after sternal puncture, the smears from these guinea-pig marrows have the great advantage that there are very few red blood cells, so that the nucleated cells of the marrow are usually seen singly against a clear background. On the other hand, a serious disadvantage is the relatively high proportion of damaged cells (see Chart), which must be taken into account in any quantitative technique.

How Reliable is the Technique Employed?

An obvious question which must be asked at the outset concerns the accuracy and reliability of the technique, and of the results thereby obtained. In order to put this to the test we took a series of 17 normal guinea-pigs and made parallel estimations of the cell content of the right and left humeral marrow, which it seemed reasonable to assume would be similar in composition (Harris *et al.*, 1954). The interesting result emerges that although in some cases the counts on the two sides may be very close to one another, whereas in other cases there may be a marked discrepancy, yet, taking the data for the entire series and subjecting them to the customary statistical analysis, the figures for the two sides are very much the same, except in the case of a small cell group such as the monocytes (Table I). It thus appears that, despite the errors inherent in haemocytometric techniques in general, and the additional sources of error which might be expected in the quantitative marrow technique just described, the results nevertheless seem to be reasonably reliable, especially if one takes a large enough series.

TABLE I.—*Comparison of Mean Absolute Marrow Counts in Right and Left Humerus of 17 Guinea-pigs*

Cell Type	Right	Left
Erythroid	272,218	273,162
Myeloid	389,687	386,802
Lymphocytes	301,131	326,000
Monocytes	19,941	50,952
Damaged	316,792	291,427
Total nucleated cells	1,402,217	1,383,810
M E ratio	1·526	1·452

From data of Harris *et al.* (1954). Counts are in cells per c.mm. of marrow.

The Main Cell Groups in Normal Marrow

The Chart indicates in diagrammatic form the absolute numbers of the main cell groups in normal marrow. It will be seen that in this particular series the lymphocytes number about 300,000 per c.mm. of marrow, and it should perhaps be emphasized that the overwhelming majority of these are small lymphocytes. In this series, too, the lymphocyte count is on the high side, and, with a total absolute count of close on 1,500,000 nucleated marrow cells per c.mm. of marrow, the lymphocytes are about 20% of the marrow cells. In earlier experiments somewhat lower counts were obtained—for example, 142,000 (Yoffey *et al.*, 1951), 246,000 (Hudson *et al.*, 1952), and 322,000 (Yoffey *et al.*, 1954). A direct comparison of these figures with the data available for human marrow is not possible, since, with the exception of very occasional counts such as those of Isaacs (1937) and Gordon (1939), no absolute figures are available for man. But the percentage counts of lymphocytes in our guinea-pig marrows are much the same as those reported for man—for example, Osgood and Ashworth (1937) 10.6%, Wintrobe (1951) 10%, Osgood and Seaman (1944) 14%, Whitby and Britton (1953) 5–20%, Vaughan and Brockmyre (1947) 16.22%, Leitner (1949) 7.6%, Piney and Hamilton-Patterson (1946) 14–21%; and in children, Joppich and Liessens (1937) 14–57%, Doan and Zerfas (1927) 37.3%.

With a blood lymphocyte count in the guinea-pig of about 5,000 per c.mm., it is abundantly clear that a count of 150,000–300,000 lymphocytes per c.mm. of marrow is a figure large enough to warrant serious consideration, for it cannot possibly be due to contamination of marrow by blood, as has often been alleged in man—for example, Petri (1934)—to account for the presence of lymphocytes in sternal puncture material. Even from the evidence of sternal puncture material alone, it is clear that this explanation does not hold good. For if the absolute count of lymphocytes in the bone marrow is appreciably higher than in the blood, then even after the marrow has been diluted by blood there should still be a perceptible difference in lymphocyte content between the diluted marrow and blood. Blitstein (1945) paid special attention to this point, and found in 16 cases that the average lymphocyte count in the blood was about 3,000 per c.mm., whereas in fluid from sternal puncture it was 15,200 per c.mm.

In our guinea-pig experiments, in which the preliminary exsanguination reduced to a minimum the amount of blood left in the marrow, it is even more obvious that if there are about 5,000 lymphocytes per c.mm. of blood the presence of 150,000–300,000 lymphocytes per c.mm. of marrow is far in excess of anything which could possibly be due to blood contamination.

It is perhaps not very remarkable that the large numbers of lymphocytes in the bone marrow have escaped the notice of clinical haematologists; for without quantitative data lymphocytes could only be described as a percentage of the marrow cells. The position in regard to bone marrow has in fact been very much what it would be in the case of peripheral blood if the latter could be examined only in stained smears, without any absolute counts.

It must further be emphasized that the marrow lymphocytes, which, taking the marrow as a whole, form one of the largest collections of lymphocytes in the body, are scattered diffusely throughout the marrow and not normally arranged as organized lymphoid nodules. Lymphoid nodules (cf. Williams, 1939) may occur in bone marrow under pathological conditions, but they are not normal marrow constituents; nor, in fact, is there any evidence of multiplication of marrow lymphocytes, mitoses in which are few and far between. If lymphocytes are being constantly formed in the marrow and discharged into the blood, the problem of the blood lymphocytes becomes more perplexing than ever.

The Total Marrow Volume

In the quantitative study of bone marrow it is important not merely to know the cell counts per unit of marrow but also to have some idea of the cell content of the bone marrow as a whole. This necessitates a knowledge of marrow volume, and, despite the difficulties arising out of the diffuseness and inaccessibility of the bone marrow, data concerning marrow volume have been obtained by a number of observers. Thus Mechanik (1926) found that in man the bone marrow was from 3.4 to 5% of the body weight, but of this amount about one-half was red and the other half fatty marrow. The red marrow thus was a little over 2% of the body weight, and this is the same kind of figure as has been arrived at by Nye (1931–2) in the rabbit, though possibly a little lower than the estimates of Fairman and Corner (1934) in the rat. Our own data (Hudson and Yoffey, 1954) for the guinea-pig are of the same order, and in the following rough calculations a marrow volume of 2% of the body weight gives a total volume of 8 ml. in a 400-g. guinea-pig.

Haemopoietic Equations

The logical goal of the quantitative study of blood cells and their formation would be to describe haemopoiesis in terms of a number of different equations. Though we have not yet enough data to formulate these equations with as much accuracy as we should like, the following three examples will serve as a first approximation not altogether devoid of interest, and perhaps of value.

1. A Comparison of Thoracic Duct and Marrow Lymphocytes

In a previous paper (Yoffey and Parnell, 1944) we endeavoured to make a quantitative comparison in the rabbit between the total daily thoracic duct lymphocyte output and the estimated total marrow lymphocyte content. Using the thoracic duct lymphocyte data of Sanders *et al.* (1940) and our own figures for marrow lymphocytes, the average marrow lymphocyte content in a 2.25-kg. rabbit was found to be $2,330 \times 10^6$, while the average daily thoracic duct lymphocyte output was $3,500 \times 10^6$. Though we have not since then made any further quantitative studies of rabbit bone marrow, we realize now the imperfections of

our earlier technique, and feel fairly certain that in fact the lymphocyte content of rabbit marrow is appreciably higher than our 1944 data indicate. It is at any rate clear that the figures for thoracic duct and marrow lymphocytes are roughly of the same order, and from a purely quantitative point of view the daily disappearance of large numbers of lymphocytes from the blood could be accounted for by their passage into the bone marrow. It is evident, of course, that the fact that thoracic duct and marrow lymphocytes are roughly equal in number does not in itself prove that blood lymphocytes are passing into the marrow, and quite conceivably the reverse could be the case.

However, if lymphocytes are being formed in the marrow, a simple calculation on the lines of the myeloid and erythroid equations given in the following paragraphs will suffice to show that with a count of 200,000 lymphocytes per c.mm. of marrow, and on the basis of one mitosis per lymphocyte per day, the number of lymphocytes daily entering the blood from the marrow alone would be of the order of 60,000 per c.mm. of blood. If to these the thoracic duct and other lymphocytes are added, then the problem of the blood lymphocytes becomes more mysterious than ever.

However, under normal conditions there is virtually no sign of lymphocyte multiplication in the marrow. It has already been noted that, like the thoracic duct lymphocytes, the marrow lymphocytes are preponderantly of the small variety, and mitoses in small lymphocytes are very few indeed, whether in marrow or lymphoid tissue.

2. The Myeloid Equation

Both the myeloid and the erythroid equation are here calculated on the basis of data obtained by Harris *et al.* (1954), though not included in the paper as published. For the myeloid equation all the granulocytes are considered together; the great majority of them are in fact neutrophil —or, rather, in the guinea-pig pseudo-eosinophil.

The blood granulocytes amounted (mean of 17 guinea-pigs) to 1,150 per c.mm. Calculated for a 400-g. guinea-pig, with a blood volume of 27,000 c.mm. (data of Dr. A. F. Rogers, of the Physiology Department, University of Bristol), the total blood granulocytes would be 31×10^6. On the other hand, the marrow granulocytes, at 390,000 per c.mm. and with a marrow volume of 8,000 c.mm., amount to $3,120\times10^6$. Now, while these calculations may not possess the accuracy of a physico-chemical equation, I believe they give a fairly good indication of the general trend. It seems clear that in this series, in which admittedly the blood granulocytes were on the low side, the myeloid reserve in the marrow was about 100 times the granulocytes present in the blood.

Furthermore, practically three-quarters of the marrow granulocytes were mature, either with segmented nuclei, or with nuclei of "band" form, and almost ready for discharge into the circulation. Were this discharge to happen, a very considerable leucocytosis of the order of 75,000 per c.mm. could presumably develop very readily, though how long it lasted would depend on the length of time the granulocytes remained in the blood. Behind these mature or almost mature granulocytes, for the most part incapable of mitosis, are the immature myeloid cells forming about one-fourth of the marrow granulocytes capable of active cell division. If these immature cells could undergo mitosis twice a day, which does not seem to be too unreasonable a supposition, the mature cells could be daily replaced, and a sustained leucocytosis of anything up to a maximum of 75,000 per c.mm. should not be beyond the bounds of possibility.

3. The Erythroid Equation

Similar calculations in the case of the red cells give a completely different picture. Thus the mean R.B.C. count in the series was 5,510,000 per c.mm., and with a blood volume of 27,000 c.mm. the total number of red cells in the circulation would be of the order of $149,000\times10^6$. We have no data as yet on the life span of the guinea-pig erythrocyte. But, in the rat Berlin and Lotz (1951), after feeding glycine-2-C^{14}, estimated that the life span of the normal red cell was 64 days, while Neuberger and Niven (1951), using glycine labelled with N^{15}, found that the mean normal life of the rabbit erythrocytes was about 65–70 days. If, therefore, we assume the life span of the guinea-pig red cell to be of the same order as that of the rat and rabbit—say 70 days—$2,130\times10^6$ new red cells would need to be formed in the bone marrow daily and discharged into the blood stream to keep the blood red cells at a constant level.

Now the nucleated red cells of the marrow in this series were 270,000 per c.mm., and with a marrow volume of 8,000 c.mm. the total nucleated red-cell population of the marrow would be $2,160\times10^6$. Disregarding individual stages in red-cell development, with their different mitotic rates (cf. Dacie and White, 1949), if the nucleated red cells of the marrow as a whole underwent mitosis once in 24 hours, enough red cells would thereby be produced both for the needs of the blood and to replenish the marrow population. On the face of things a purely quantitative appraisal would suggest that erythropoiesis is much more perilously poised than granulopoiesis, and that the bone marrow has a much smaller margin of reserve so far as red-cell formation is concerned unless the mitotic rate of the erythroid cells can greatly exceed that of the myeloid, or unless there is a constant accretion of many fresh stem cells.

The equations just presented are obviously far from perfect, and there are a number of factors which need to be taken into account before the fundamental haemopoietic equations can be correctly written. The speed of mitosis is one of the vital unknown factors, and so too is the possibility of the duration of the mitotic cycle undergoing change in response to different stimuli. The life span of the circulating leucocytes is also something about which we are still far from fully informed, and for an adequate calculation of leucocytosis more accurate information would be needed about this. Up to the present, widely varying estimates of the life span of the different blood leucocytes have been put forward, including one which gives the blood leucocytes as a whole a blood span of something like nine days (Kline and Cliffton, 1952).

With further additions to our knowledge it may be that the crude haemopoietic equations presented above will be improved upon so as to give much more valuable indications of the essential interrelationships between bone marrow, blood, and lymphoid tissues.

Other Applications of the Quantitative Technique

The quantitative methods which I have described have already been applied to two groups of experiments. We first tried to investigate the effects of A.C.T.H. and cortical extracts on the bone marrow (Yoffey *et al.*, 1951; Hudson *et al.*, 1952), but, though the results obtained were of interest, we felt that perhaps a larger number of experiments was needed. The action of cortisone (compound E) was accordingly investigated in a larger series (Yoffey *et al.*, 1954), and it was found that in guinea-pigs, despite their alleged refractoriness to cortisone, its administration in doses of 5 mg. a day for seven days produced a clear increase in the erythroid population of the marrow, as well as a rise in the total count of nucleated marrow cells

TABLE II.—*Effect of Cortisone (5 mg. daily for seven days) on Guinea-pig Marrow*

Cells	Control	Cortisone	t
Erythroid	367,000	561,000	2·9
Lymphocyte	322,000	338,400	0·36
Total	1,842,000	2,346,000	1·90
M: E ratio	1·70	1·34	1·22

All counts in cells per c.mm. marrow. From the data of Yoffey *et al.* (1954).

(Table II). We cannot yet say whether it will prove possible experimentally to stimulate erythropoiesis to the point of actual polycythaemia. Dr. G. Hudson is at present reinvestigating both the short-term and long-term effects of A.C.T.H. and 11-oxysteroids on the haemopoietic system, with the object *inter alia* of trying to ascertain whether he can induce an experimental overproduction of red cells.

Anoxaemia

Finally I had hoped to be able to say something about our studies on the effects upon the bone marrow of anoxaemia. Last summer our group (Drs. E. H. Batten, W. J. Gall, G. Halley, R. S. Harris, A. F. Rogers, and myself) went to the Jungfraujochstation, at a height of over 13,000 ft. (3,960 metres), to investigate this problem. Unfortunately, we have not yet completed the statistical analysis of our extensive data, but it may perhaps be of interest to say that during the first five days of exposure to the lessened oxygen content of the air at the Jungfraujoch the two most significant changes in the bone marrow were an increase in its erythroid cells, as might be expected, but also a very definite decrease in the marrow lymphocytes. This response of the lymphocytes recalls observations such as those of Dameshek and Valentine (1937), who noted that in cases of pernicious anaemia the marrow lymphocytes were above the normal level, but fell markedly soon after treatment was begun. A fall in the marrow lymphocytes in circumstances in which there is a sudden increase in red-cell formation could be explained in several ways. It might be argued that lymphocytes were being rapidly discharged from the marrow to make room for the increase in red cells. But in our guinea-pig experiments a simple calculation indicates that this ought to lead to an appreciable lymphocytosis, which does not in fact occur.

Another possibility is that lymphocytes are becoming transformed into red-cell precursors, and the evidence of our Jungfraujoch material, which we hope to present in full before long, seems to point in this direction.

Summary

After a brief review of lymphocyte production, a quantitative technique is described for studying the nucleated cells of bone marrow. The three main cell groups in the marrow are (1) erythroid, (2) myeloid, (3) lymphocytes. In the marrow of 17 normal guinea-pigs the mean count of these cells per c.mm. was approximately: erythroid, 273,000; myeloid, 390,000; lymphocyte, 310,000.

In relation to the cell content of the blood, the marrow appears to possess a greater reserve of myeloid than of erythroid cells. Brief mention is made of some of the problems to which the quantitative study of the bone marrow is being applied.

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THE CONTROL OF ANTICOAGULANT THERAPY IN MYOCARDIAL INFARCTION

BY

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Anticoagulant treatment with drugs of the coumarin type is now recognized to be a great advance in the management of acute myocardial infarction. In the published series which evaluate the effect of this treatment the evidence suggests that the mortality and complication rates are reduced for the first month after an infarction (Tulloch and Gilchrist, 1950, 1951; Irving Wright *et al.*, 1948; Irving Wright, 1952; Loudon *et al.*, 1953). The necessity for a control series in all such studies is generally agreed, but the validity of finer classification of cases into good or bad risks at the onset of the illness has been questioned, and some—for instance, Irving Wright (1953)—do not believe that such detailed classification is possible or that it is justifiable to withhold anticoagulant treatment even in what seems to be a "good risk" case at the outset. It appears, therefore, that all patients with acute myocardial infarction should receive a course of treatment in hospital with a coumarin anticoagulant unless there is a clear contraindication.

While the immediate benefit from such short-term treatment is not in doubt, there is as yet no information about its effect on the late mortality in survivors of a single attack, say at the end of a year. If it were shown that the benefit ceased with the anticoagulant course, there would be a strong case for prolonged out-patient treatment, provided this could be made safe and effective for general use. In any event, it is probable that a tendency to intravascular thrombosis persists in patients who have had one myocardial infarct, and the experimental work of Payling Wright *et al.* (1953) suggests that long-continued administration of coumarin anticoagulants does speed up recanalization of blocked arteries. For these reasons it is likely that large-scale out-patient treatment will have to be considered very

seriously, and not least from the point of view of safe and effective control. The standard method of treatment, based on frequent "prothrombin time" estimations and an empirical therapeutic range, is safe in hospital if scrupulously carried out, but its well-known risk of haemorrhage makes it more difficult to apply to outpatients.

The object of this paper is to discuss, in the light of recently acquired knowledge and techniques, some fundamental problems in regard to the mode of action of coumarin drugs and, consequently, the safest effective method of controlling their dosage; and to suggest a possible approach to a solution of these problems.

Action of Coumarin Anticoagulants

When the one-stage test of Quick was introduced it was believed that it measured prothrombin (Quick *et al.*, 1935). In recent years it has become evident that this is not so, and that severe lack of prothrombin (below 10%) (Biggs and Douglas, 1953a) will prolong the clotting-time in the one-stage Quick test by only 5–10 seconds, depending on the activity of the tissue thromboplastin used—a prolongation below the conventional therapeutic range for anticoagulant therapy. Prothrombin, in fact, is affected to a very variable degree by coumarin drugs, rarely, with therapeutic doses, falling below 30% as measured by the two-stage area method of Biggs and Douglas (1953a), and may be within normal limits while the one-stage test is adequately prolonged (see Table). Severe depression of prothrombin can, however, result from overdosage.

A normal clotting-time in the one-stage test depends on at least two factors other than prothrombin, lack of either of which will produce a prolongation of the clotting-time far in excess of that produced by prothrombin deficiency. The best-known of these is factor V or ac-globulin (Quick, 1953; Owren, 1947). Fortunately it is unaffected by coumarin-type anticoagulants, and therefore need not be considered further. The other factor—factor VII (Koller *et al.*, 1951), cothromboplastin (Mann, 1949), SPCA (Alexander *et al.*, 1949), convertin (Owren, 1951)—is the one principally affected by those drugs (Douglas, 1952; Tudhope and Hunter, 1953). It is reduction in the concentration of factor VII which produces the prolonged clotting-time in the Quick test when coumarin anticoagulants are given, since the one-stage clotting-time is corrected by the addition of this factor (see Table).

Drug	One-stage (Quick) Test			Two-stage Prothrombin % of Normal
	Normal Plasma (secs.)	Patients' Plasma (secs.)	Patient's Plasma + 10% factor VII (secs.)	
Ethyl biscoumacetate ..	12	24	13	84
" ..	12	45	16	42
" ..	11	36	17	21
" ..	11	26	14	33
" ..	11	27	13	56
Phenylindanedione ..	11	26	13	83
" ..	11	22	13	73
" ..	13	28	14	85
Naphthylhydroxy-coumarin	12	24	14	72

The precise means whereby lack of factor VII affects the coagulation is by impairment of intrinsic blood thromboplastin generation (Biggs and Douglas, 1953b; Walker and Hunter, 1954) as studied by the blood thromboplastin generation test (Biggs *et al.*, 1953; Biggs and Douglas, 1953b), and it is probably on this that the therapeutic action depends. The situation, however, is complicated by the observation, made by Koller (1953) and ourselves (Walker and Hunter, 1953, unpublished observations), that in patients given coumarin drugs the generation of intrinsic blood thromboplastin may be impaired at a time when the one-stage test is normal or only slightly prolonged. We have noted this impairment both before the one-stage test has been prolonged (Fig. 1) and on cessation of treatment shortly after it has returned to normal (Fig. 2), either under the influence of vitamin K_1 (Koller) or spontaneously (Walker and Hunter, unpublished observations).

Impaired blood thromboplastin generation has also been found in patients under treatment whose one-stage clotting-times had temporarily fallen below 20 seconds, and in patients in whom the conventional therapeutic level was not achieved at all. To date, 37 out of 46 patients with one-stage clotting-times of 20 seconds or under have shown impaired blood thromboplastin generation when their serum was used in the generating mixture. This phenomenon is not due to lack of factor VII, unless we assume that the thromboplastin generation test is a much more sensitive measure of factor VII deficiency than the one-stage test. It may equally be due to lack of the Christmas factor, which cannot be measured by the one-stage test, since the levels of this factor in coumarin-treated patients have not been studied in an adequate number of cases (Biggs, 1953, personal communication). We do not think that the evidence at present known to us justifies the postulation of an additional serum factor (factor X, Koller, 1953), though we have not yet had the opportunity of studying Koller's data or of ascertaining that we are observing the same phenomenon.

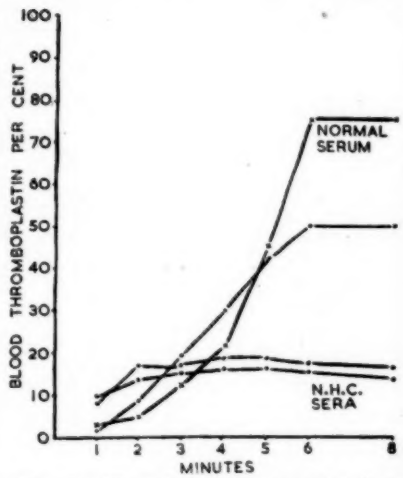

FIG. 1.—Thromboplastin generated from same mixture of normal platelets and normal Al(OH)$_3$-treated plasma using normal serum (upper curve) and serum from three patients 24 hours after 200 mg. of naphthylhydroxycoumarin (N.H.C.) by mouth, when one-stage time was still normal (lower three curves). Serum is source of factor VII and Christmas factor. 100% thromboplastin represents a clotting-time in the substrate plasma of 10 seconds.

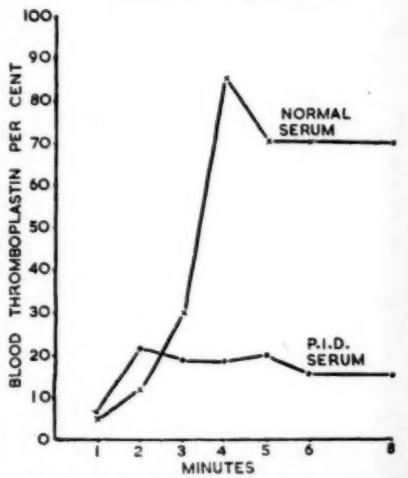

FIG. 2.—Blood thromboplastin generated from normal reagents (upper curve) and from same mixture using serum from patient receiving phenylindanedione (P.I.D.), when the one-stage time had returned to normal (lower curve).

These observations, if confirmed, may have an important bearing on the dosage necessary for therapeutic effect.

The Therapeutic Level

A one-stage clotting-time (Quick) of about 30 seconds with a control time of 12–14 seconds is considered to be the therapeutic level. The reason for this may simply be that it indicates the largest dose that can be given with reasonable safety, although an additional point is that the whole blood of such a patient will show a definite prolongation of its clotting-time in lustroid or silicone tubes. This level is now known to be associated with therapeutic benefit. In view of the actions described above, however,

it is worth while considering which effects are essential to therapeutic benefit and should therefore be aimed at with minimal dosage in the interests of safety.

Of the factors involved, prothrombin is the least likely to be concerned with the therapeutic action. Dicoumarol has a greater effect on prothrombin than ethyl biscoumacetate ("tromexan"), and Irving Wright (1953) found no significant difference in clinical results between series treated with these two drugs. This conforms with the variable and often high prothrombin levels found in patients with a one-stage test within the therapeutic range.

If reduction in factor VII is the important action, then the one-stage test should give a reliable measure of therapeutic level. But reduction in factor VII results in impaired blood thromboplastin generation, and this effect has been achieved while the one-stage clotting time is normal or nearly so. If it were found possible to bring about consistent impairment of blood thromboplastin and therapeutic benefit, with minimal prolongation of the one-stage clotting-time, then it might be possible to treat patients adequately with much smaller doses than hitherto believed necessary, thus eliminating the danger of bleeding—a most important consideration in out-patient treatment.

The Danger of Haemorrhage

For many years a constant source of anxiety to the clinician has been unexpected and dangerous bleeding in patients under treatment, and one of the big problems of anticoagulant therapy is to determine the factor or factors principally concerned with the onset of haemorrhage. As these factors need not necessarily be the same as those principally concerned with the therapeutic effects, it may become possible to eliminate the danger of bleeding without lessening therapeutic efficiency. One such possibility has been mentioned in the preceding section.

It is generally agreed that bleeding is rare when the one-stage test is within the "therapeutic limits." Even within these limits, however, it was noted (Stirling and Hunter, 1951) that bleeding might occur, in the absence of obvious predisposing conditions such as peptic ulcer, whenever the one-stage time was more than 30 seconds, and it was also noted then that the patients in whom the time was above 40 seconds did not bleed more frequently than those in whom it was between 30 and 40 seconds. There is, therefore, beyond certain limits, no hard-and-fast correlation between the results of the Quick test and the tendency to bleed—suggesting that haemorrhage may not be primarily due to factor VII deficiency. The precise cause of haemorrhage is in fact obscure, but we suggest that one possible reason why most patients given coumarin anticoagulants never bleed is that their prothrombin concentration is adequate (see Table).

Three cases have recently been encountered (two out-patients and one in hospital) in which the continuation of bleeding was correlated with very low prothrombin levels —below 10% of normal—rather than with the one-stage test, and are to be described in detail elsewhere. Both out-patients had stopped their drug at least 24 hours before admission, and had therefore entered the recovery phase: their one-stage clotting-times were probably much longer at the onset of haemorrhage than they were found to be on admission. However, the fact remains that both were bleeding, one seriously, at a time when their one-stage times were within the accepted therapeutic level. In the third case the one-stage test was within therapeutic limits when bleeding started, and prothrombin was found to be almost absent. On the other hand, we have had cases in which the prothrombin fell to very low levels and no bleeding occurred.

The findings suggest that prothrombin deficiency may be related to the cause of haemorrhage and show that, whatever the one-stage time may be at the onset of bleeding, severe prothrombin deficiency and haemorrhage can exist when the one-stage time is only moderately prolonged. While it is admitted that with all the well-known anticoagulants prothrombin is not greatly reduced until very low levels of factor VII are reached and that scrupulous maintenance of the one-stage time in the region of 30 seconds is a reasonable safeguard, it is clear that with the doses at present regarded as necessary this safeguard, especially in the case of out-patients, is by no means absolute, and that any possibility of establishing a therapeutic range by impairing blood thromboplastin with minimal prolongation of the one-stage time, and hence with smaller doses and a greater margin of safety, is at least worthy of investigation. The possibility exists that the required dosage might be small enough to avoid prothrombin deficiency and also haemorrhage.

Comment

Although long-term anticoagulant therapy is probably very important in the treatment of coronary thrombosis, it is possible in the light of present knowledge, as we have indicated, that a period of more strict laboratory control and study of the different factors may further increase the benefits and lessen the dangers of this treatment. It is necessary to determine the minimal prolongation of the one-stage clotting-time which is associated consistently with impaired blood thromboplastin generation and to seek confirmation by clinical studies that the therapeutic results in these circumstances compare favourably with the present regime. For these reasons it is desirable that a standardized trial of out-patient treatment in specialized units should be made. For the trial period the laboratories concerned should carry out agreed standard techniques in order that their results may be comparable.

In the meantime, no revolutionary change in the method of management in hospital is proposed. Routine laboratories should continue to use the one-stage test and to accept its usual interpretation in terms of therapeutic and haemorrhagic levels. The other tests suggested above for research purposes are too complicated for routine use.

Summary

Some of the unsolved problems in the mode of action and control of treatment with anticoagulant drugs in myocardial infarction are described.

In view of the varying effect of coumarin anticoagulants on the known clotting factors, and our present lack of knowledge concerning which factor or factors are important, it is suggested that treatment might be made more effective and less dangerous, and eventually more simple and capable of application in domiciliary practice, if for a trial period clinical investigations were correlated with detailed laboratory studies to determine the safest and most effective method of control.

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THE CLINICAL PATTERN OF INJURY IN ROAD ACCIDENTS

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The Royal Hampshire County Hospital, Winchester, is the main hospital for acute cases in a rural area through which run many main roads, including some leading to the South Coast and the South-west. For this reason it is felt that if the road-accident figures for such a hospital were capable of analysis, both clinical and statistical, certain factors of interest in assessing the clinical pattern of injury in road accidents might emerge as a result of the findings. With this in mind, all the road-accident cases, no matter how trivial their injuries, attending in the two-year period ending December 31, 1952, have been investigated, comprising all those attending the hospital in its capacity as the parent hospital of the management committee group, and those which could not be dealt with in the cottage type of hospital.

It is not claimed that the findings resulting from a scrutiny of the 717 cases concerned present in any way a picture of a national trend, or even an accurate cross-section of road-accident casualties treated in the hospitals of this country. The investigation is merely a fact-finding one on a fairly large number of such cases attending a particular hospital, and can in no way be related to general mortality figures through road accidents, as the deaths recorded are only of those who died after admission to hospital.

The cases taken are subdivided into five broad groups: motor-cyclists, motorists, cyclists, pedestrians, and miscellaneous (lorries, omnibuses, etc.). In Tables II and III the miscellaneous group is split into its component parts for the sake of clarity.

The grading of injuries presented a very difficult problem, as many of the patients suffered from multiple injuries, and in order to build a complete picture all these have been included, no matter how slight. A general classification, based on broad functional end-results, has been adopted, as follows:

0 = Minor injuries in which full recovery took less than three months and left no disability.

+ = Cases in which recovery took longer than three months and/or left the patient with some permanent disability or disfigurement, but not enough to interfere with normal wage-earning.

++ = Cases in which enough permanent disability resulted to interfere seriously with the patient's livelihood.

+++ = Complete disability.

The last three together are referred to as "severe" injuries. Finally, as in Tables I and IV, the deaths are shown separately with the injuries sustained.

One great difficulty lies in considering individual lesions, because a person may be completely crippled through having multiple injuries, yet each taken separately might be classified + only. For this reason, in Table I the numbers shown refer to persons, whereas in Tables III and IV figures are expressed as injuries rather than persons.

Deaths (Tables I and IV)

It is worth while to consider the 27 deaths in the series together. The largest number occurred among the motor-cyclists—13 (50% of the whole series or 5% of all motor-cycle cases). The largest proportion in any group, however, occurred among the pedestrians—9 deaths (10% of

TABLE I.—*General Table of Severity of Injury*

	Total	Degree of Severity								Cause of Death
		0		+		++		+++		Deaths		
	No.	No.	%	No.	%	No.	%	No.	%	No.	%	
Motor-cyclists	268	197	74	29	11	17	6	12	4	13	5	Head injuries, 11; ruptured liver, 1; torn pericardium, 1
Motorists	180	155	86	11	6	11	6	1	1	2	1	Fractured thyroid cartilage, 1; ruptured spleen, 1
Cyclists	120	105	87	11	9	1	1	1	1	2	2	Head injuries, 2
Pedestrians	91	64	70	10	11	6	7	2	2	9	10	Head injuries, 5; haemothorax, etc., 1; shock (multiple injuries), 1; pulmonary embolism, 1; haematemesis 1
Miscellaneous	58	50	86	5	8	1	2	1	2	1	2	Head injuries, 1
Totals..	717	571	80	66	9	36	5	17	2	27	4	Head injuries, 19 (70%); thoraco-abdominal injuries, 4 (15%); others, 4 (15%)

TABLE II.—*Type of Vehicle and Manner in which Patient was Involved, by Age and Sex*

	Males										Females										Total
	0–14		15–24		25–44		45–64		65+		0–14		15–24		25–44		45–64		65+		
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	
Motor-cycles:																					
Drivers	—		107	50	87	40	18	8	1	1	—		—		3	1	—		—		216
Passengers ..	1	2	11	21	6	12	1	2	—		1	2	15	28	11	21	6	12	—		52
Cars:																					
Drivers	—		6	9	24	37	20	30	5	8	—		1	2	6	9	3	5	—		65
Passengers ..	14	12	8	7	10	9	7	6	3	3	13	11	5	4	19	17	24	21	12	10	115
Cyclists	14	12	38	32	21	17	17	14	4	3	7	6	8	7	5	4	5	4	1	1	120
Pedestrians ..	21	23	3	3	10	11	9	10	14	15	9	10	2	2	5	6	4	5	14	15	91
Lorries:																					
Drivers	—		1	14	3	43	3	43	—		—		—		—		—		—		7
Passengers ..	2	10	5	23	8	38	4	19	2	10	—		—		—		—		—		21
Buses:																					
Passengers only	1	7	—		3	20	4	26	—		1	7	—		4	26	2	14	—		15
Vans:																					
Drivers	—		—		1	100	—		—		—		—		—		—		—		1
Passengers ..	—		1	20	1	20	—		—		1	20	1	20	1	20	—		—		5
Miscellaneous ..	—		—		—		2	100	—		—		—		—		—		—		2
Doubtful	—		2	29	3	42	—		—		—		—		2	29	—		—		7
Total	53	7	182	26	177	25	85	12	29	4	32	4	32	4	56	8	44	6	27	4	717
					526 (73%)										191 (27%)						

the cases in that group). Most deaths were due to head injuries—19 (70% of all deaths). In the motor-cyclists no fewer than 11 of the 13 deaths (85%) were due to this cause, though, possibly owing to the increased use of crash-helmets, these figures may be a little higher than would be expected at the present time. Nevertheless, even if the motor-cyclists are discounted, head injuries still predominate among the remainder (8 out of 14, or 57%).

The next commonest cause of death was crushing injury. In this group there were 4 (15% of all deaths). In the remaining 4, 2 deaths (from a haematemesis and a pulmonary embolus) can be regarded to some extent as coincidental—both occurred in elderly pedestrians. If these are excluded the pedestrian mortality drops to 7.5% of the cases in that group. Even this figure, however, is significantly higher than in any other group under review.

Motor-cyclists

There were 268 motor-cyclists involved (38% of the total), made up of 216 drivers and 52 passengers. The drivers were almost exclusively male (99%), as is to be expected, whereas most of the passengers were female (63%).

TABLE III.—*All Injuries, by Site and Type of Victim**

	Total Cases	Total Injuries Sustained	Arm				Head and Neck		Trunk		Leg						Shock Only	
			Right		Left						Right				Left			
			a/e		a/e		b/e						a/k		b/k		a/k		b/k			
			No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Motor-cycles:																						
Drivers	216	368	24	7	33	9	15	4	28	7	115	31	21	6	35	10	42	11	30	8	24	7	1	
Passengers ..	52	74	—		7	9	5	7	5	7	24	33	10	14	7	9	7	9	2	3	7	9	—	
Cars:																								
Drivers	65	111	6	5	6	5	6	5	11	10	41	37	10	9	14	13	2	2	12	11	3	3	—	
Passengers ..	115	190	9	5	7	3	11	6	10	5	81	43	17	9	19	10	8	4	12	7	8	4	8	4
Cyclists	120	191	15	8	20	11	26	14	15	8	67	35	14	7	11	6	9	4	9	4	5	3	—	
Pedestrians ..	91	155	4	3	8	5	11	7	9	6	49	32	15	10	21	13	9	6	19	12	10	6	—	
Lorries:																								
Drivers ..	7	12	—		2	17	1	8	1	8	5	42	—		1	8	2	17	—		—		—	
Passengers ..	21	36	6	16	3	8	2	6	2	6	10	27	6	16	2	6	2	6	2	6	1	3	—	
Buses:																								
Passengers only	15	20	—		3	15	1	5	—		8	40	1	5	3	15	2	10	1	5	1	5	—	
Motor vans:																								
Drivers ..	1	1	—		—		—		—		1	100	—		—		—		—		—		—	
Passengers ..	5	9	1	11	1	11	2	22	—		1	11	—		2	22	1	11	1	11	—		—	
Miscellaneous ..	2	6	—		1	17	—		1	17	1	17	1	17	2	33	—		—		—		—	
Doubtful	7	10	1	10	1	10	1	10	—		4	40	1	10	—		—		2	20	—		—	
Totals ..	717	1,183	66	5	92	8	81	7	82	7	407	34	96	8	117	10	84	7	90	8	59	5	9	1

TABLE IV.—*All Injuries, by Site and Severity**

	Degree of Severity	Total Cases	Total Injuries Sustained	Arm				Head and Neck	Trunk	Leg				Shock Only
				Right		Left				Right		Left		
				a/e	b/e	a/e	b/e			a/k	b/k	a/k	b/k	
†Motor-cyclists	0	197	352	21	28	18	31	118	29	30	30	25	21	1
	+	29	29	—	5	1	1	6	—	4	8	2	2	—
	++	17	20	—	2	—	—	3	—	—	6	2	7	—
	+++	12	22	3	3	1	1	1	—	6	4	2	1	—
	Deaths	13	19	—	2	—	—	11	2	2	1	1	—	—
	Total	268	442	24	40	20	33	139	31	42	49	32	31	1
†Motorists	0	155	275	14	13	17	21	116	24	26	9	19	8	8
	+	11	11	—	—	—	—	2	1	3	1	2	2	—
	++	11	11	1	—	—	—	3	—	3	—	3	1	—
	+++	1	2	—	—	—	—	—	1	1	—	—	—	—
	Deaths	2	2	—	—	—	—	1	1	—	—	—	—	—
	Total	180	301	15	13	17	21	122	27	33	10	24	11	8
Cyclists	0	105	175	14	20	24	15	60	12	8	9	8	5	—
	+	11	12	1	—	2	—	5	1	2	—	1	—	—
	++	1	1	—	—	—	—	—	—	1	—	—	—	—
	+++	1	1	—	—	—	—	—	1	—	—	—	—	—
	Deaths	2	2	—	—	—	—	2	—	—	—	—	—	—
	Total	120	191	15	20	26	15	67	14	11	9	9	5	—
Pedestrians	0	64	123	4	8	10	9	41	11	15	6	15	4	—
	+	10	11	—	—	1	—	1	—	2	1	3	3	—
	++	6	8	—	—	—	—	1	1	3	—	1	2	—
	+++	2	3	—	—	—	—	1	—	1	1	—	—	—
	Deaths	9	10	—	—	—	—	5	3	—	1	—	1	—
	Total	91	155	4	8	11	9	49	15	21	9	19	10	—
†Miscellaneous	0	50	86	8	10	6	4	28	9	8	5	6	2	—
	+	5	5	—	—	1	—	1	—	2	1	—	—	—
	++	1	1	—	—	—	—	—	—	—	—	—	—	—
	+++	1	1	—	1	—	—	—	—	—	—	—	—	—
	Deaths	1	1	—	—	—	—	1	—	—	—	—	—	—
	Total	58	94	8	11	7	4	30	9	10	7	6	2	—
All types	0	571	1,011	61	79	75	80	363	85	87	59	73	40	9
	+	66	68	1	5	5	1	15	2	13	11	8	7	—
	++	36	41	1	2	—	—	7	1	7	7	6	10	—
	+++	17	29	3	4	1	1	2	2	8	5	2	1	—
	Deaths	27	34	—	2	—	—	20	6	2	2	1	1	—
	Grand Total	717	1,183	66	92	81	82	407	96	117	84	90	59	9

* In Tables III and IV a/e and b/e=above and below the elbow respectively, and a/k and b/k above and below the knee.
† In this table passengers and drivers are not separated.

Of the passengers, 32 were known to have been brought in with their drivers, while the driver of one case was known to have been admitted to a Service hospital elsewhere. There were two accidents involving motor-cycle combinations in which more than two passengers were injured. Of the remaining 17, it is not recorded if they were brought in alone or with their drivers. In addition, it is known that the pillion passengers of two drivers were killed outright and are therefore not included.

Injuries

Motor-cyclists not only were the most numerous of the various groups under review, they also had the largest proportion of severe (non-fatal) injuries (22%). The mortality rate (5%) is misleading, as only patients admitted alive to the hospital are considered. When the mortality and morbidity of motor-cyclists and pedestrians are compared (5% of motor-cyclists and 10% of pedestrians died; 22% of motor-cyclists and 20% of pedestrians had injuries) it is important to note the differing age structures (Table II). Children are included among the pedestrians, whereas there is no one under the age of 16 among the motor-cyclists. The mean age for severe injuries was 28 for motor-cyclists and 44 for pedestrians, and for deaths 43 and 59 respectively. Motor-cyclists tend to be injured at an age when they are of most use to the community, as 118 (44%) cases occurred in the 15–24 age group.

As might be expected a large number of injuries to the head and neck were sustained in this group (Table III) although the great majority were not severe (Table IV shows 118 in the minor injury class). Possibly this is an argument in favour of the wearing of crash-helmets, as in many of the 118 cases such injury could probably have been avoided by the use of helmets.

As regards individual injuries, Table III shows that there is a slight but definite preponderance of injuries to the right side (155 right limbs to 116 left). Similarly, in the severe cases, there were 29 patients with right-sided injuries to 16 left, 3 having injuries to limbs on both sides. A suggested explanation is that where the rule of the road is the left the right side of the body is more likely to be injured by opposing traffic. This possibility is borne out by an interesting accident which occurred in August, 1951, when two motor-cyclists, each with a pillion-rider, travelling in opposite directions in traffic, apparently simultaneously decided to overtake their respective streams and collided. The four people involved all sustained serious injuries to their right sides.

The first motor-cycle had on it two 18-year-old soldiers. The driver sustained multiple injuries to his right upper limb, including a complete traumatic brachial plexus palsy, and, in the right lower limb, fractures of the femur, patella, and medial malleolus (the first two compound), a lacerated ankle, and vasospasm of the main vessels below the knee. The pillion-rider had injuries to the right leg consisting of fractures of both neck and shaft of the femur (the latter compound), tibia, and fibula, and a laceration opening the knee-joint. The second motor-cycle carried a brother and sister aged 27 and 24 years respectively. The driver had multiple injuries to his right arm, including a fractured scapula, humerus (at two levels with musculo-spiral nerve involvement), radius, and ulna, and extensive lacerations of the hand. In his right leg he had two fractures of the femoral shaft (the lower one compound) and an open wound of the knee-joint. The pillion-rider had a complete disorganization of her right knee, with compound fractures of both femoral condyles and a comminuted, simple fracture of the right tibia and fibula. Thus, in this accident, only the right side of each individual was involved, all four sustaining compound fractures of the femur and open wounds of the knee-joint, while the drivers, in addition, had very severe injuries to their right arms.

Attention is drawn to one specific injury in that in three cases there were *complete, irrecoverable brachial plexus injuries*: (*a*) the case already quoted above, (*b*) a boy of 16½ with a left brachial plexus palsy; and (*c*) a man who, in addition to very severe injuries to the right leg, sustained such a severe traction injury to the right axillary region that there was complete disruption of both nerve and vessels, and a high above-elbow amputation had to be carried out. This number is too small to be statistically significant, and during the two years under review no other cases of brachial plexus injury were seen at all.

Of the eight people who attended the hospital twice following road accidents, no fewer than six were motor-cyclists. This point emphasizes the greatly increased risk of accident to motor-cyclists compared with the other groups of road users. It is of interest to note that of the 216 drivers of motor-cycles 197 (91%) were aged 15–44 (which in itself can be narrowed by reason of the fact that no person may drive a motor-cycle at 15). This age period may be taken to include the most venturesome years—a fact which no doubt was a contributory cause.

Motorists

There were 182 motorists in this series—65 drivers, 115 passengers, and 2 whose status was not known. (In the tables these two have had to be included in the "doubtful" category.) Of these, 8 were detained 24 hours for observation, no specific injury being discovered. These have been classified as "shock" only. Among them were 5 children whose parents were among those admitted.

There were 55 male and 10 female drivers. It cannot be deduced from these figures that men are worse drivers than women, as the ratio of male drivers to female clearly cannot be ascertained. The ages of drivers were fairly evenly spread over all groups from 20 to 64, and no significance can be drawn from them.

There were 73 female and 42 male passengers. The only inference to be drawn from this is the obvious one that where husband and wife motor together the husband usually drives. There was nothing of significance to be obtained from the age grouping; the figures correspond roughly to a cross-section of the community as a whole.

What is brought out by these figures, however, is the ratio of passenger casualties to drivers. Further, as a large number of cars have only the driver and many others have only one passenger, the suggestion is that the passengers run a greater risk of injury than the drivers. This impression is supported by the fact that it is known that 33 of the passengers came in groups of two or more from 14 cars in which the driver was not injured. A further 41 single passengers were brought in without their drivers, so that only 41 are known to have been brought in with the driver of their vehicle also injured (29 drivers). There was no mention of passengers among the remaining 36 drivers, though, of course, some may have had passengers with them who escaped injury.

It is also of interest to note that of the 14 children under 5 brought in from motor-cars, two fell out of the car while it was moving, though neither was seriously hurt.

Injuries.—On the whole this series shows that injuries to motorists tend to be fairly light. There were two deaths, both of passengers. One, a woman of 50, who was a passenger in the rear seat of a car run into from behind, sustained crushing injuries to the abdomen and chest. The other was a man of 37 who sustained a fracture of his thyroid cartilage and suddenly collapsed and died in the casualty department while being examined. As in other groups, the majority had some kind of injury to the head and face (122 cases, 68%), but only five of these were classified as severe. Among individual injuries it was noticeable that of the 78 lower limbs involved 36 affected the knee (46%). This proportion was a little higher among the drivers (61% of lower limbs) than among the passengers (36%), presumably because the driver strikes his knee on the dashboard. Also of interest was that there were 4 posterior dislocations of the hip, all right-sided—three in passengers and 1 in a driver. These were the only cases of dislocated hip in the whole series. No explanation can be offered of why the right hip only was involved.

Cyclists

There were 120 cyclists (94 males, 26 females). As with motorists, no inference can be drawn from the high incidence of males, as the sex ratio of a normal cross-section of cyclists is not known. The age grouping shows a marked predominance of cases (52, or 44%) occurring between the years 10 and 24.

Injuries.—Injuries to cyclists were comparatively light; 11% of all cases were classified as severe, the lowest proportion of any group (Table I). There were two deaths, both from head injuries. One explanation of the lightness of the injuries suffered by this group may be that cyclists tend to fall off their bicycles rather than to crash into other fast-moving vehicles. Of individual injuries one feature was the greater proportion of upper limbs involved compared with lower limbs (70% of all injuries in this group) (Table IV). A possible explanation is that cyclists often come off their bicycles by going over their handlebars, and put out their hands to protect themselves, whereas motor-cyclists, moving so much faster, do not have time to do this.

Pedestrians

Of the 91 pedestrians 57 were males and 34 females. At first sight it would seem that male pedestrians are more careless than females; but the ratio of accidents between the sexes is reasonable in view of the fact that there are more men working outside the home than women; and from observance of the various means of transport it is possible to form the opinion that men are more at risk as pedestrians than women. It is, however, unsafe to do more than speculate on the evidence to hand in view of the comparatively few cases involved.

Most cases occurred at the two extremes of life. There was a heavy toll of children, no fewer than 20 of the 91 cases occurring in the five-year period comprising the ages of 3 and 7. There was a similar trend in the older age groups, 28 being 65 or over.

The greater incidence in the advanced age groups is even more obvious when the number of accidents is related to the very much reduced number surviving in those groups.

Injuries.—The relative severity of the injuries to pedestrians compared with the other groups is the outstanding feature—33% received severe or fatal injuries (Table I). This is a very high proportion when it is realized that every road-accident patient brought into the hospital during the period under review has been included, no matter how trivial the injuries. It was noticeable that there was a bigger proportion of lower-limb injuries than in any other group—32 upper to 59 lower limbs, or a ratio of 1 to 1.8. When the severe cases are considered this is more obvious still. Of the 18 cases 14 had severe lower-limb lesions only, and a further case classified +++ sustained, in addition to a very severe head injury, a central dislocation of the right hip. So 15 out of 18 (83%) severe pedestrian injuries involved the lower limbs, whereas there was only one serious upper-limb lesion.

Miscellaneous

The vehicles in this category are subdivided as lorries, 28 cases; omnibuses, 15; motor-vans, 6; wheel-chair, 1; farm trailer, 1; vehicle not known, 5. These numbers are all too small for detailed analysis, but one or two points of interest are worth noting.

Lorries.—Of the 28 cases in this series, no fewer than 21 (75%) were passengers, and 15 of these came in without the driver, 5 being in one lorry. Two more drivers came in with their passengers. As it must be more common for lorry drivers than car drivers to travel alone, it appears that lorry passengers are even more vulnerable than passengers in cars. Possibly, this is due to the increased vulnerability of people travelling in the body of an open lorry. There were 12 known instances of this practice in the series, and there may have been others.

Omnibuses.—All 15 cases were passengers. Of these, 9 came from the only bus crash in which the occupants were hurt. Five of the remaining 6 were adults who were injured while boarding or alighting. Points that arise therefore are: (*a*) Only one accident to a bus in the whole series caused casualties among those travelling in it, which suggests that buses are a very safe form of transport. This does not, of course, include other road users injured by buses. (*b*) Many injuries in buses occur when boarding or alighting from a moving vehicle.

Motor-vans.—Of the 6 cases involved only one was a driver; this again emphasizes the increased risk to the passenger.

Summary

Of the 717 road-accident injuries attended at one hospital over a two-year period the principal findings were: motor-cyclists comprised the largest number of cases and, with pedestrians, the greatest number of severe injuries and deaths; by far the largest single cause of death was head injury; in motor-cyclists the right side was injured more often than the left; in motorists knee injuries were common and passengers appeared to be more vulnerable than drivers; cyclists tended to sustain injury to their upper limbs more than did other groups; pedestrians tended to have leg injuries; most pedestrian cases occurred at the two extremes of life; in all groups males predominated over females.

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DASHBOARD FRACTURE OF PATELLA

BY

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The purpose of this article is to draw attention to the potentially disabling injury of the knee-joint commonly sustained by the driver or front-seat passenger of a motor-car involved in a collision. The outstanding feature of the injury, which is produced by impact of the knee with the dashboard, is a fracture of the patella. It will be shown, however, that this particular fracture of the patella differs in mechanism, pathogenesis, and prognosis from that produced by lesser forms of direct or indirect violence. Furthermore, and in so far as it is related to automobile design and equipment, this injury is preventable.

Mechanism of Injury

The form of the fracture is determined by the height of the dashboard and the length of the limb: a central transverse or a comminuted fracture involving the entire bone occurs if the patella is driven against the flat face of the board; a comminuted fracture of the inferior pole in the direction from above downwards and backwards if the lower pole strikes the free edge; and a comminuted fracture of the superior pole in the direction from below upwards and backwards if the knee is driven under the free edge.

In addition to the fracture which results from the direct violence, in a large proportion of cases there is wide separation of the fragments, with extensive tearing of the medial and lateral expansions. The injury thus combines the features of fracture by direct and indirect violence. It is of interest to speculate on the mechanism of the so-called indirect violence. It is probable that the victim braces the quadriceps to meet the impact and, the fracture having occurred, the contracting muscle tears the expansions. On the other hand, there was some evidence that division of the patella, having thrown the quadriceps out of action, permitted extreme flexion of the joint in the follow-through of the impact. In one case the driver sprang out of the car unaware that he had fractured his patella, and the knee collapsed beneath him when he attempted to cross the road.

In relation to the torn expansions, it is to be noted that the greater the damage the less may be the subsequent swelling of the joint. The overlying soft tissues are thickened by contusion, but synovial effusion and haemorrhage escape through the rent in the capsule into the tissue planes of the leg.

In the present series there were 25 fractures in 22 patients, five of whom were women. The right side was involved on eleven occasions, the left on eight; and in three patients, two of whom were women, the injury was bilateral.

The sites and types of fracture were: comminuted superior pole, 1; transverse central, 6; comminuted entire bone, 2; comminuted inferior pole, 13; lateral marginal, 3.

Complications

In ordinary circumstances fracture of the patella is an isolated injury: treatment and final result are seldom determined by general or local complications. When local complications do exist, as in the unfortunate combination with fracture of the shaft of the femur, the difficulties of treatment and the effect on the final result are well known. In the dashboard fracture, complications are the rule rather than the exception.

General Complications.—Head, thoracic, or extremity injuries of a degree of severity which endanger life may preclude any form of treatment or take precedence in such a manner as to influence the final result. Five were Service cases, of which no records were available. In only three of the remaining 17 were associated injuries described as trivial. Fourteen patients incurred 23 injuries:—Head and neck: fracture of skull, 1; concussion, 3; fracture of mandible, 1; fracture of cervical spine, 1; laceration of face, 7. Chest: fracture of sternum, 1; fracture of ribs, 1; Arm: fracture of ulna, 2; one of which was compound; fracture of metacarpals, 1; dislocation of metacarpo-phalangeal joint, 1. Leg: fracture of tibia, 3; two of which were compound; wound of other knee-joint, 1. In two of these patients the complicating injuries were such that no treatment of the patella was possible; in three, these injuries delayed treatment from one to four weeks; and in the remaining nine treatment was uninfluenced.

Local Complications.—In the fracture of the inferior third, which is the commonest variety, the smaller fragment is crushed between the edge of the dashboard and the femoral condyles, with consequent contusion of the intervening soft tissues. The injury to the overlying skin varies between an abrasion and a wound exposing the femoral condyles. A superficial abrasion, however, situated at a site normally subject to pressure, is no indication of the severity of the underlying contusion of tendon, expansions, fat pad, synovial membrane, and even femoral condyles, which have such a profound influence on the final result.

In four of the Service fractures the state of the skin was unknown. Of the remaining 21, 5 were compound and 10 showed abrasions worthy of record. In 14 instances, in addition to the fracture, the lateral expansions were torn and the fragments widely separated. In four cases, all simple injuries, special features were depressed fractures of the articular cartilage of the inferior aspect of the femoral condyles.

Treatment

The treatment adopted followed current practice: fractures without displacement in which the extensor mechanism was intact were treated by conservative means (3); central transverse fractures without comminution where accurate anatomical reduction was possible, by internal fixation by screw (1); fractures of upper or lower thirds with comminution, by excision of the smaller fragments and suture of the tendon to the remaining fragment (10); where the whole bone was comminuted, all fragments were excised and the extensor apparatus was repaired (2); lateral marginal fractures were treated conservatively (1), or by excision of a displaced fragment (2).

The remaining six fractures received primary treatment elsewhere (4) or no treatment (2), and are not included.

In operating, it is important to remember that the violence involved is greater than that normally encountered in a fracture of the patella. The contusion and consequent devitalization of the deep layers of the skin, of the underlying soft tissue, and of the expansions immediately adjacent to the fracture indicate danger from sepsis; and immediate operation may be indicated in the presence of a potentially infective skin abrasion. For the same reason the removal of skin sutures may have to be deferred. Unless the knee is flexed in the course of operation the injury to the inferior aspect of the articular surface of the femur may pass unnoticed.

Results of Treatment

As might be expected, the results are related to the violence of the injury and the presence of complications. (1) The lesser injuries in which only immobilization was indicated secured a full return of function. (2) A patient aged 54, with a transverse fracture, treated by internal fixation, attained bony union and a painless knee but only 35 degrees of flexion. (3) In the polar fractures with comminution, results in terms of flexion varied between 65 degrees and full movement. Six patients failed to attain 90 degrees, one had 90 degrees, and only one had full movement. Recovery in these cases was slow, being characterized by delayed healing of the wound and brawny thickening in the anterior capsule, which in some instances lasted for many weeks. It is clear that the loss of flexion is due to dense fibrosis in the contused soft tissue. (4) Of the two patients with fractures necessitating excision of the entire bone, one secured full flexion, the other 45 degrees. It was of interest, in reviewing a case with bilateral fractures—one treated by total excision and the other by reduction and internal fixation—that the patient, aged 54, persistently referred to the knee in which the patella had been retained as her "good knee," despite the fact that the range of movement was only 35 degrees, 10 degrees less than that from which the patella had been excised. (5) All patients with lateral marginal fractures made a complete recovery.

Of the two patients with fractures which received no treatment on account of life-endangering complications, one attained 70 degrees flexion, the other 35 degrees. The four fractures which received primary treatment elsewhere were all transverse central in type, and all had been subjected to operative reduction and suture with wire or other material: one, a compound fracture treated by wiring, became infected and resulted in ankylosis; one attained union with 55 degrees flexion; and in two there was non-union. Of the latter, one had an extension lag with instability and 100 degrees of painful flexion; he refused further treatment. The other was subjected to a second operation at which both fragments were excised; in the final result 85 degrees flexion was secured.

The records of this series of dashboard fractures suggest that the results of treatment are poor and below average for fractures of the patella in general. The features concerned are: (1) The nature of the injury, which has already been described. The position is perhaps over-simplified by the statement that the ordinary fracture is an injury of the

extensor apparatus, whereas the dashboard fracture is less an injury of the extensor apparatus than a violent contusion of the components of the knee-joint. (2) Absence of appropriate primary treatment: The demands of complicating life-endangering injuries often dictate the nature and timing of treatment. (3) Age of the patient. Apart from the Service patients, whose average age was 25 years, the youngest of this series was 32 and the oldest 66, the average being 45. The age of the patient in a gross injury of the knee-joint influences the result; the only perfect result of a comminuted fracture of the lower pole occurred in the youngest patient.

Discussion

The road accident problem of Britain is largely that of collision between car and pedestrian or cyclist; the American problem is of collision between car and car (*Autocar*, 1949). The fracture which has been described has been recognized for many years as a clinical entity in America, and, according to Ferciot (1939), is being encountered with increasing frequency. Most orthopaedic surgeons will confirm a similar tendency in this country.

The injury has been named "dashboard" fracture; but it can be produced by impact with any rigid projection, such as glove-tray, umbrella handle hand-brake, and radio set or heater controls which oppose the front seat; and the victim of a collision who escapes with nothing more than a fracture of the patella is fortunate. The knee injury, however, is often only one of multiple injuries sustained in a similar manner; but it is the well-defined mode of production which is important, for it serves to illustrate a mechanism of injury in automobile accidents which merits serious consideration.

The orthopaedic surgeon called upon to treat the results of collisions at all hours of the day and night may be excused if he shows a professional interest in certain features of automobile engineering which have received little attention from the industry and none from the public. It should be possible to prevent, or at least to modify in degree, the variety of injuries produced by violent contact with the dashboard, windscreen, and steering wheel; suggestions to this effect have come from the profession in the past (Ferciot, 1939; Woodward, 1948). There is something wrong with a design which produces in the same patient a bilateral fracture of the patella with the edge of the dashboard and a bilateral compound fracture of the upper third of the tibia with the sharp edge of the glove-tray located immediately below.

Must the dashboard be rigid? Need it be studded with projecting knobs, switches, and glass-faced dials to break the teeth and disfigure the face of a child when the driver brakes in an emergency? Can it not be sprung or hydraulically mounted, padded with rubber of suitable consistency, and generally made less dangerous? Is the rigid glass windscreen which produced head or facial injuries in half the patients of this series essential? Is a plastic windscreen which ejects on contact, said by Woodward (1948) to be fitted to one make of American car, impracticable? If the steering column can be made adjustable for angle and length, and the wheel to absorb road shocks, could they not also absorb a blow from the chest rather than inflict fractures of sternum and ribs and grave injuries on the vital underlying structures? Is the compulsory fitting of safety-belts a fantastic idea; or is it just a matter of time?

These are but a few of the many possibilities which suggest themselves in the course of investigating the causes and complications of a particular injury. Such safety measures could have no effect on the incidence of road accidents; but they could exert a favourable influence on morbidity and residual disability.

Summary

The mechanism of injury in dashboard fractures of the patella is described.

Twenty-five fractures are reviewed in regard to type, complications, treatment, and result.

The difference between "dashboard" and "ordinary" fractures is stressed.

Suggestions are advanced for the protection of the front-seat occupants of a car from dashboard fractures and associated injuries of similar mechanism.

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HEART FAILURE IN CHILDREN WITH ACTIVE RHEUMATIC CARDITIS

BY

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Heart failure is generally regarded as not uncommon in children with rheumatic carditis, and it is accepted as important evidence that that carditis is active (Bland and Jones, 1951). Differing views have been expressed on the efficacy of digitalis in its treatment. Thus Schwartz and Schwedel (1930) found no response in 12 cases, whereas Sutton and Wyckoff (1931) noted improvement in all their 22 cases. In the more recent series of Walsh and Sprague (1941) there was a beneficial effect in 15 cases but no response in 20.

In our experience at Taplow, heart failure in rheumatic carditis has been uncommon, but it has usually responded well to digitalis. The differences between our findings and those of others may be due to the distinction we make between pericardial effusion and heart failure: abnormal signs may easily be attributed to heart failure, whereas they are in fact due to effusion. The distinction may be difficult, for in both conditions there may be dyspnoea with reduced vital capacity, increased jugular venous pressure, and enlargement of the liver. Furthermore, pericardial friction may not be heard in effusion, the electrocardiogram may be normal, and the radiological appearances may be similar to those of dilatation. The question is of more than academic interest, however, for the prognosis of effusion is better than that of failure: of 23 patients with effusion and no evidence of failure seen here during the last four years, four died; of seven with failure, three died.

The diagnosis of effusion was confirmed in 11 out of 23 cases: by aspiration of fluid in one, by radiography after the passage of a catheter (Wood, 1951) in six, and at necropsy in four. These 11 cases and the remaining 12 of the pericardial effusion group presented a single complex of clinical and radiological signs. The seven cases showing failure presented another and different complex, and the absence of fresh pericardial effusion was confirmed at necropsy in three. The object of this paper is to delineate the two complexes of signs which characterized these two groups, according to the classical method for the definition of clinical syndromes.

Salient Features of Pericardial Effusion

The clinical and radiological signs of rheumatic pericardial effusion have been described previously (Thomas,

Besterman, and Hollman, 1952; Besterman and Thomas, 1952). The present series of 23 cases includes 11 from the earlier one and 12 that have been seen recently. Effusion may develop at any time during the course of the disease, and not infrequently in the early stages of a first attack. Fever—100–104° F. (37.8–40° C.)—at the onset is invariable. Tachypnoea is common; it occurred in all cases of our earlier series, though not in all those of the later one. Chest pain is usual, but often of short duration. The jugular venous pressure is raised at the onset unless the effusion is small; enlargement of the liver frequently occurs later. Abnormal signs at the lung bases are almost invariable; they are most pronounced on the left side, develop early, and are due usually to pleural effusion. Diminution in intensity of the apex beat and dullness beyond the apex beat are much less common. The sedimentation rates are invariably high and in most cases there is a leucocytosis. The most striking radiological signs are rapid changes in heart size and shape; in 13 cases in which skiagrams had been taken at frequent intervals the cardio-thoracic ratio (C.T.R.) increased from a mean of 54% to 68% over a period of 11 days.

The Findings in Seven Episodes of Heart Failure

By contrast, the findings in seven episodes of what I believe to have been failure, in all of which there was raised venous pressure and enlargement of the liver, were as follows: subnormal temperature, 95–97° F. (35–36.1° C.) in six and 97–98° F. (36.1–36.7° C.) in one; a sedimentation rate consistently below 10 mm. per hour in four and falling from high to lower levels in three (from 60 to 11, from 60 to 30, and from 80 to 35 mm. per hour); rales at the lung bases in five (three had hilar congestion on *x*-ray examination, but none had pleural effusions); peripheral oedema in two; ascites in two; leucocytosis in none. In three cases the skiagrams showed no change in heart size, in three there was a slight increase (the C.T. ratio increased from 57 to 61%, from 66 to 71%, and from 66 to 72%), and in one a decrease during digitalis therapy; in none was there any rapid change in size or shape as had been observed in effusion.

A gain in weight of more than 1 kg. occurred in only one episode (2 kg. over two weeks); there was obvious peripheral oedema and ascites. In another with oedema and ascites, however, there was no weight gain. In two there was a gain during recovery from failure (2 kg. over seven weeks in each); this gain was maintained and could be accounted for by resumption of growth and reaccumulation of fat and muscle with subsiding rheumatic activity. It is thought, therefore, than an absence of gain in weight does not exclude the diagnosis of failure in active rheumatic carditis, for a gain due to the water and salt retention of failure may be balanced by a loss of tissue due to inanition and increased metabolism; substantial gains occur only when fluid retention is gross enough to cause peripheral oedema. All seven episodes were treated with digitalis; in four there was a good response (Fig. 1), though in two digitalis therapy had to be supplemented by low-salt diet and mersalyl; in the other three there was some initial response, but signs of failure later recurred despite digitalis, and death ensued within two to six weeks.

Failure occurred only in patients with well-marked valve lesions and cardiac enlargement, and usually after long-continued rheumatic activity or in second attacks. Thus five had had continued activity for between twelve and eighteen months in a first known attack, and one for nine months in a second. The remaining patient went into failure ten weeks from the onset of her first known attack, but this was a particularly severe one and death occurred after four and a half months.

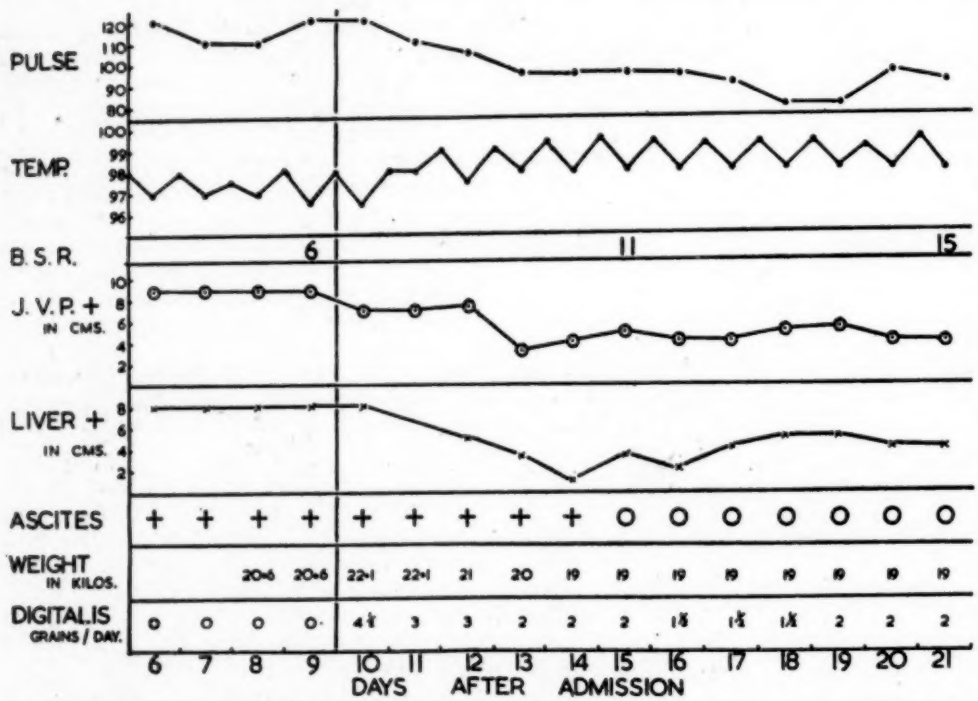

FIG. 1.—Response to digitalis in case diagnosed as having heart failure. Prompt rise in temperature and fall in pulse rate and venous pressure; later, diminution in size of liver and disappearance of ascites.

Comparison of the Findings in 7 Cases with Heart Failure and 23 Cases with Pericardial Effusion

	Months of Preceding Rheumatic Activity			Temperature	E.S.R.	Leucocytosis (Above 13,000)	Oedema	Ascites	Pleural Effusion	Rapid Changes in Heart Size and Shape	Hilar Congestion	Response to Digitalis Therapy
	0–1	2–6	6+									
Heart failure (7 cases)	0	1	6	95–97° in 6, 97–98° in 1	Normal or fell in 7	Nil	+ in 2	+ in 2	Nil	Nil	+ in 3	+ in 4
Pericardial effusion (23 cases)	17	5	1	101–104° in 23	Raised in 23 (above 100 in 12)	+ in 21/23	Nil	Nil	+ in 22	+ in 21/21	Nil	Nil

Heart Failure Precipitated by Hormone Therapy

Two patients developed clinical and radiological signs similar to those described above as indicating failure during hormone therapy for prolonged rheumatic activity; in both, these signs were attributed to heart failure due to water and salt retention. Within two days of starting treatment the venous pressure rose, the liver became enlarged and pulsatile, the temperature fell to 95° F. (35° C.), and the sedimentation rate dropped from 52 to 3 mm. an hour in one case and from 55 to 12 mm. an hour in the other. Peripheral oedema developed later in both, and in one a chest *x*-ray film showed hilar congestion. One patient responded well to injections of mersalyl; hormone therapy could then be continued without further signs of failure. The other showed little response to mersalyl alone but had a good diuresis on digitalis and mersalyl; an even better diuresis was obtained when an ion-exchange resin ("zeokarb") was added. Frequent skiagrams throughout these two episodes showed no significant change in heart size. The findings on which these two patients were regarded as having failure, as distinct from those that might have occurred in effusion, were the subnormal temperature and fall in sedimentation rate, the liver pulsation, the ascites and hilar congestion in one case each, the absence of any sudden change in heart size or shape, and the good response to treatment. Both had well-marked murmurs and considerable cardiac enlargement at the start of therapy.

The points on which I believe pericardial effusion may be distinguished from heart failure are shown in the Table. They may be summarized as follows. Effusion may develop at any time and not infrequently within four weeks of the onset of the first known attack, whereas failure usually occurs only in patients with well-marked heart lesions and after long-continued activity; the temperature and sedimentation rate are invariably high in effusion, whereas in failure the temperature is subnormal and the sedimentation rate falls; signs of fluid at the lung bases are common in effusion but rare in failure; peripheral oedema and ascites may occur in failure but not in effusion; skiagrams show rapid changes in heart size and shape in effusion but no such rapid change in failure; hilar congestion is not uncommon in failure but does not occur in effusion; there is often a good response to digitalis in failure but no response in effusion; a leucocytosis is common in effusion and rare in failure.

These differences may be further illustrated by reference to two cases; one patient was admitted on two separate occasions, initially with failure and later with pericardial effusion; the other was first diagnosed and treated as heart failure, but was later proved to have had effusion as well.

Case 1

A girl of 7 was admitted four months after the onset of her first known attack. Despite the short history, she had loud murmurs and marked cardiac enlargement and showed dyspnoea, a raised venous pressure, enlargement of the liver, and ascites; the temperature was subnormal and the sedimentation rate low (3 mm. an hour). She was treated with digitalis, to which there was a good response within three days, but skiagrams showed only a 1-cm. reduction in heart size over the following ten weeks (Fig. 2, A and B). This episode was therefore regarded as heart failure.

On her second admission she also showed a high venous pressure and enlargement of the liver, despite previous maintenance doses of digitalis. This time, however, her temperature and sedimentation rate were high, there were signs of fluid at the lung bases, and she had a polymorphonuclear leucocytosis; there was no ascites. During the next eighteen days the temperature, sedimentation rate, and venous pressure fell, and skiagrams showed a reduction in

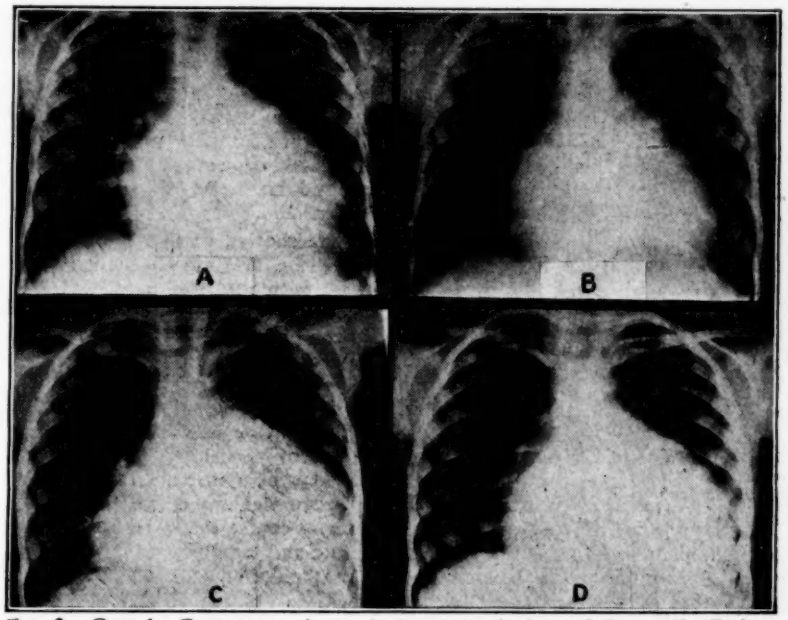

FIG. 2.—Case 1. Contrast in change in heart size in heart failure and effusion. Heart failure: A, September 21, 1949, td./id. (transverse diameter of heart–internal diameter of chest) = 14.5/21.5; B, November 30, 1949, td./id. = 13.5/21.5: reduction in heart size of only 1 cm. over ten weeks. Effusion: C, November 21, 1950, td./id. = 16.5/21.0; D, December 9, 1950, td./id. = 14.5/21.0; decrease of heart size of 2 cm. over 18 days.

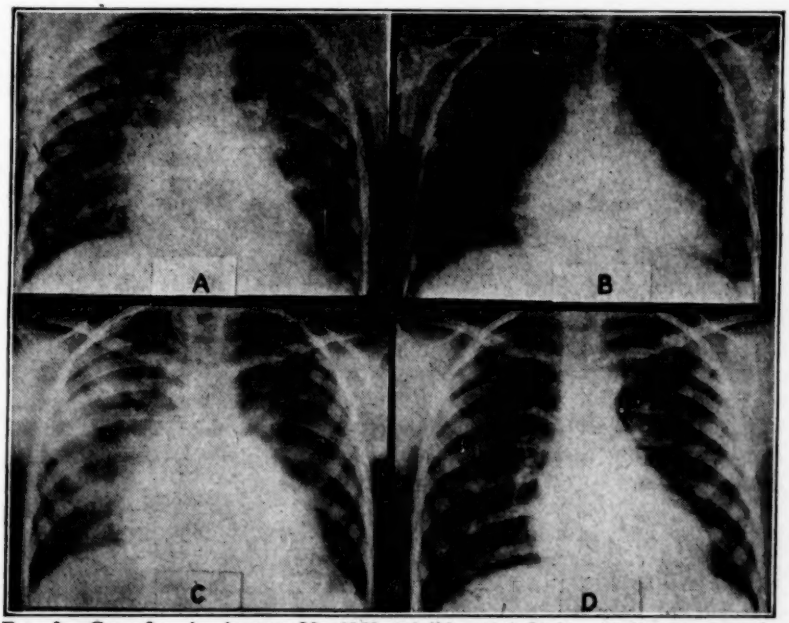

FIG. 3.—Case 2. A, August 25, 1952 (td./id. = 11.5/21.5). Moderate generalized enlargement and slight hilar congestion. B, September 11, 1952 (td./id. = 14/21.5). Marked increase in heart size due to development of pericardial effusion; also small left pleural effusion. C, September 25, 1952 (td./id. = 14/21.5). Hilar congestion but no further increase in heart size after eight days on cortisone. D, December 19, 1952 (td./id. = 11.5/21.5). Return to previous heart size and shape from resolution of effusion.

heart size of 2 cm. (Fig. 2, C and D). It is thought that this episode was due to pericardial effusion and not to heart failure.

Case 2

A boy of 10 was admitted four weeks after the onset of his first known attack of rheumatic fever. He had loud murmurs, and a skiagram showed moderate generalized enlargement and slight hilar congestion (Fig. 3, A). The temperature was 103° F. (39.4° C.), sedimentation rate 134 mm. per hour, and white count 19,000, with 80% polymorphs; the venous pressure was raised, the liver was enlarged, and there were rales at the lung bases. In view of the hilar congestion and the absence of radiological evidence of effusion, he was thought to have failure and was put on to digitalis. Four days after admission he developed a left pleural effusion. There was then some slow improvement in his general condition, but his venous pressure was still raised after eighteen days, when digitalis had to be stopped as there was electrocardiographic evidence of first-degree heart-block. His slow improvement continued despite stopping digitalis, and his venous pressure returned to normal seven days later.

A review of his chest skiagrams at this time showed that a pericardial effusion had developed during the first two weeks of admission; the heart size had increased by 2.5 cm. over 17 days (Fig. 3, A and B). There is little doubt that many of his abnormal signs had been due to this effusion and not to failure, and that this accounted for the high fever, raised sedimentation rate, and polymorph leucocytosis at the onset, and, later, the signs of fluid at the left base and failure to respond to digitalis. One week later he was put on to cortisone on account of persistent signs of rheumatic activity. On the eighth day of starting treatment he became dyspnoeic, the liver became enlarged, the venous pressure rose, and there were many coarse rales throughout both lungs; the sedimentation rate and temperature were normal and a skiagram showed marked hilar congestion but no change in heart size (Fig. 3, C).

A diagnosis of heart failure precipitated by sodium retention was made; he was given mersalyl at once and put back on to digitalis. There was a good response to mersalyl; 48 hours later the clinical signs of failure had disappeared and there was no radiological evidence of congestion, though the heart size remained unchanged. It was then possible to continue cortisone therapy, but he was kept on digitalis until 14 days after the hormone had been discontinued; at no time did any further signs of failure develop. Skiagrams later showed a gradual resolution of the effusion, and the heart returned to the same size and shape as it had been on admission (Fig. 3, D).

Summary and Conclusions

Heart failure in rheumatic carditis is thought to be less common than has been previously supposed; in many cases the signs of so-called heart failure are due to pericardial effusion. The ways of distinguishing between heart failure and pericardial effusion are discussed. Chief among them are high fever, raised sedimentation rate, and polymorph leucocytosis in effusion as compared with subnormal temperature, low sedimentation rate, and normal white blood count in failure; peripheral oedema, ascites, and sometimes liver pulsation in failure but not in effusion; rapid changes in heart size and shape in effusion but little change in failure; and a good response to digitalis and other treatment in failure and no response in effusion. Heart failure is rare except in patients with well-marked murmurs and cardiac enlargement who have often had long-continued preceding rheumatic activity, whereas effusion may occur when there is little or no other evidence of heart involvement and not infrequently within four weeks of the onset of a first attack.

I wish to thank Dr. Paul Wood and Dr. E. G. L. Bywaters for their helpful criticism and advice.

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THE GENERAL PRACTITIONER AND THE CHILD WITH HEART DISEASE*

BY

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It has long been recognized that certain medical problems can be tackled more satisfactorily by a team than by a man working on his own. As early as 1888 the British Medical Association published the results of a collective investigation into acute rheumatism, and included an inquiry into the influence of home and social conditions (Whipham, 1888). The value of joint studies has also been recognized by the College of General Practitioners, which is actively fostering research and seeking to provide facilities for its prosecution.

With this encouragement it is tempting to face the challenge written in 1952, as a commentary on the first European Congress of Cardiology. "Judging by the papers at the Congress, cardiology is more concerned with 'ends' than with 'beginnings' of disease; for, apart from one paper on the inheritance of benign essential hypertension, aetiology was ignored. . . . If research were planned logically, then the major effort would centre round the aetiology and prevention of rheumatic heart disease, atherosclerosis, and hypertension." (*Lancet*, 1952). And, to quote from a more recent leading article on congenital heart disease, "Surgery has improved the chances of these patients; but even so the outlook is gloomy enough to make us want to know more about causation" (*Lancet*, 1953).

Our surgical colleagues have made possible remarkable advances in the treatment of cardiovascular disease, but we must not allow their brilliant achievements to upset our sense of proportion. Only a small fraction of children with congenital heart disease can benefit from surgery. The same is true of patients with rheumatism. When 1,000 rheumatic children were observed for a period of 20 years, 117 developed mitral stenosis, but only 12 of these had significant pulmonary hypertension (Bland and Jones, 1951), and none needed valvotomy. The problem of rheumatism is medical, not surgical, for after 20 years 301 of the 1,000 patients were dead (87% of the deaths being directly or indirectly attributable to rheumatism) and another 139 were more or less severely crippled by their cardiac disability.

To the general practitioner heart disease seems to begin at 40, since until then defects of function are compensated by the body's powers of resistance; afterwards cardiovascular disease becomes increasingly manifest (R. J. F. Pinsent, 1954, personal communication). This is not wholly the result of essential hypertension and atherosclerosis, for the Registrar-General's returns

*A paper given before the Birmingham Division of the B.M.A. on February 16, 1954.

show that chronic rheumatic heart disease kills almost as many persons now (9,106 in 1952) as it did 10 years ago (10,459 in 1942). Quite a lot of the cardiovascular diseases of the forties is acquired in childhood. The child with heart disease is a challenge to us to find out what causes rheumatism and Bright's disease and congenital deformities of the heart.

Investigators all over the world have for years sought the solution to these questions. Perhaps some of the answers will be found, not by those who work in hospitals and laboratories, but by the general practitioner—in the homes of his patients.

Incidence

Little is known about the relative frequency of rheumatic and congenital heart disease in childhood. Any one practitioner is likely to count amongst his patients not more than five or six children with heart disease.

Rheumatic fever seems to be a dying disease. The wards of children's hospitals are no longer full of rheumatic children, and rheumatic schools are not now hard pressed to accommodate patients seeking admission. There has been a sharp decrease in deaths attributed to acute rheumatic fever and chorea—a decline of more than 60% between 1942 and 1952 (893 and 328 respectively). Nevertheless it is possible that we are being misled, and that the impression of a decline in rheumatism is false. Being less severe—like scarlet fever—it may be less readily recognizable, and if this be true the incidence of chronic rheumatic carditis will not necessarily decline. Patients with mitral stenosis often have such mild rheumatic fever that they deny ever having had the disease. Unfortunately there is no specific test for rheumatism, and there is no doubt that we sometimes fail to recognize the condition when we meet it.

Parkinson's (1945) plea that rheumatic fever should be compulsorily notifiable resulted in the introduction of local notification. The records obtained until the end of 1950 were analysed (Hewitt and Stewart, 1952), and the figures suggest that the annual incidence of rheumatic fever amongst schoolchildren in this country is now about 69 per 100,000. This compares with an American estimate of 31.5 per 100,000 for people of all ages (Collins, 1948). In 1939 2.6% of London schoolchildren had rheumatic heart disease (Bach *et al.*, 1939), and in 1952 it was calculated that in different parts of America between 0.1 and 6.0% of schoolchildren were afflicted (Schwentker, 1952). Each year between 3,900 and 5,000 children in England and Wales have their first attack of rheumatic fever (Conybeare, 1951; Hewitt and Stewart, 1952). Even though rheumatic fever may seem to be decreasing, it cannot be ignored.

The frequency of congenital heart disease is also difficult to determine with accuracy. Amongst Birmingham children (MacMahon *et al.*, 1953) the incidence has been shown to be at least 3.2 per 1,000 live births. Post-mortem studies (Brown, 1950) show a considerably higher incidence, amounting to 2% or more in childhood. There seem to be as many children with congenital heart disease as with rheumatic carditis. The Table shows the position as it was recently in the city of Toronto, where all forms of heart disease in childhood are notifiable (Keith, 1951). It might be expected that congenital heart disease would be commoner than rheumatic heart disease in children under the age of 5, but it is not so widely recognized that congenital heart disease is as frequent as rheumatic heart disease in children of school age, and that throughout childhood it is a commoner cause of death.

Incidence of Heart Disease in Childhood in Toronto, 1948 (Modified from Keith, 1951)

	0–5 Years	5–15 Years	Total
Children	56,000	74,000	130,000
Rheumatic heart disease ..	3 (1)	117 (4)	120 (5)
Congenital heart disease ..	139 (30)	151 (3)	290 (33)

Figures in parentheses refer to deaths.

Congenital Heart Disease

Congenital heart disease is almost always due to arrested foetal development during the period of organogenesis in the first three months of pregnancy. The hazards from an attack of maternal rubella in the first trimester have been amply confirmed since the first classic reports from Australia (Gregg, 1941; Swan *et al.*, 1943). Although the search for other agents was immediately stimulated, most investigations have been restrospective—looking back for a possible cause after an abnormal baby has been born.

There can be no reason to doubt that careful observation of pregnant women will disclose other aetiological factors, and that these are not necessarily infective. The mother's diet matters to the human foetus during the last three months of pregnancy, but less is known about dietetic requirements during the period of organogenesis. So far as I am aware it has never been proved that starvation increases the likelihood of congenital anomalies among human infants, but Warkany and Schraffenberger (1944) have shown that, in rats, a deficient diet increases the incidence of congenital deformities.

If reliable information is to be obtained about the effect of external influences on the foetus, the mother must be seen frequently during the early weeks of her pregnancy. Unfortunately a woman who is pregnant for the first time may be uncertain about her condition during the first three months, and she may hesitate to ask for confirmation. She is likely to be even more doubtful if she has regular small haemorrhages, and yet these may be an indication that foetal damage is occurring. No one has better opportunity of winning the confidence of his patients, and no investigator has such an excellent chance of observing the happenings of early pregnancy, as the family doctor. It is impossible to suggest what to look for; careful records should be kept, even of apparently trivial happenings, and at all stages of the pregnancy.

When MacMahon (1952) had shown that patency of the ductus arteriosus was relatively commoner in first than later pregnancies, he suggested that this might be due to prolonged labour, foetal distress, and asphyxia neonatorum. His colleagues (Record and McKeown, 1953), trying to confirm this suggestion, found that notes about the labour and the condition of the baby at birth were often quite inadequate for their purpose. To assess the effect of external factors, the observations of a considerable number of doctors will have to be pooled and correlated, and reliable results will depend on the accuracy with which records are kept.

In many cases, no doubt, foetal maldevelopment does not depend on the influence of external factors, but on genetic defects. Further information is needed about the familial incidence of all types of congenital defects.

The next problem is to recognize when a baby has congenital heart disease. The cases seen in hospital belong to a highly selective group, since most of these infants are referred because they have symptoms. The prognosis in this group of babies is poor, although there are some who can be cured by surgery, and others who, after a precarious first year, will improve spontaneously. This is not the occasion to consider how to distinguish between these various treatable conditions, or to consider methods of achieving an exact anatomical diagnosis. The point to be emphasized is that in hospital we get a wrong impression of congenital heart disease in infancy. Most infants with congenital lesions must have no symptoms and probably little in the way of signs. When symptoms occur they are apt to mislead, because if there is no cyanosis—and that is usually the case—the history is likely to direct attention to the lungs rather than to the heart. There may

be recurrent bronchitis, attacks of pneumonia, and shortness of breath, all of which are especially likely to occur when there is a large shunt of blood from left to right and consequent engorgement of the pulmonary blood vessels. The most readily recognizable sign is a murmur. This always awakens suspicion when it is heard, but often it is obscured, or even lacking, at first.

Like the pregnant mother, the infant must be examined often and regularly if an abnormality is to be detected. Because this precaution is neglected many of these children are first found to have a murmur, not in the neonatal period, but months or years later, when they are examined for some other reason—at a welfare centre, at the school clinic, or even at a Services medical board.

Rheumatic Carditis

When local notification of rheumatic fever was introduced the diagnostic criteria adopted were one or more of the following occurring in a person under the age of 16 years —rheumatic pains or arthritis accompanied by a rise in temperature, rheumatic chorea, rheumatic carditis, valvular disease of the heart of rheumatic origin.

It is widely believed, but not universally accepted, that when a child has rheumatic fever the heart is always damaged, although not necessarily so severely as to be recognizable by clinical methods Even when, in the initial attack, a child has such evidence of heart damage as enlargement, an obvious murmur, pericardial friction, or congestive failure, there is a 30% chance that there will be no detectable abnormality 20 years later (Bland and Jones, 1951).

Rheumatic Activity

If such a result is to be obtained and permanent damage restricted to a minimum, a child needs rest when carditis is active. The difficulty is to recognize activity, for rheumatic carditis can be a remarkably quiet process. As already mentioned, many patients with mitral stenosis deny ever having had rheumatism. Likewise, that cardinal sign of rheumatic activity the Aschoff node may be found in heart muscle biopsies of patients who have no evidence whatsoever, either laboratory or clinical, of acute rheumatism (McKeown, 1953).

Sometimes it is easy to recognize active carditis: its presence should certainly be assumed when a child with rheumatic heart disease has chorea, subcutaneous nodules, erythema marginatum, arthritis with temperature, a sore throat, or an increased blood sedimentation rate. At other times symptoms of activity are less obvious and may amount to little more than an unnatural tiredness which makes the child fractious and irritable, easily provoked to tears, and disinclined to play. The child is often pale, has a poor appetite, and complains of ill-defined muscular, joint, or abdominal pains. Active carditis is suggested also by a pulse which is rapid during sleep, by heart sounds and murmurs which alter in quality, by pericarditis or heart failure, and by a changing electrocardiographic pattern.

Children with acute rheumatism should be treated in hospital, where rest is more readily secured and where salicylates can more easily be given in adequate dosage. On the whole cortisone and A.C.T.H. have proved no more effective than salicylates, and, although the first effects may be spectacular, the action is "apparently purely suppressive, and relapse will often occur after stopping therapy unless in the meantime the disease has burnt itself out spontaneously" (Cope, 1953).

Cause of Juvenile Rheumatism

Perhaps the most important reason for sending the child to hospital is to get him away from the home which probably played a part in initiating his illness. Presumably certain factors in the environment are essential to the development of rheumatic fever, but our knowledge of the subject is limited. The disease certainly tends to run in families (Read *et al.*, 1938), and it has been argued that this is due to an inherited susceptibility (Wilson, 1940). More recent studies have failed to confirm that a Mendelian mechanism is, in fact, operative (Stevenson and Cheeseman, 1953); and, despite suggestive evidence, it is not even certain that the aggregation of cases in families is determined by heredity. The occurrence of rheumatism in several members of a family might be due to a common environment. Since it is only claimed that susceptibility is inherited, and since the susceptible subject can be recognized only after he has been exposed and has acquired the disease, it becomes extremely difficult to determine the relative importance of heredity and environment.

The B.M.A. inquiry (Whipham, 1888) drew attention to the relative immunity of the "upper classes," and all later investigations have shown that rheumatic fever is a disease of the relatively poor, who usually come of large families and from overcrowded rooms in city slums. Overcrowding matters more than poverty, damp, or undernutrition. Overcrowding increases the chance of acquiring respiratory infections.

While there is no doubt about the importance of the home environment, yet it is one of the strange things about the disease that a child rarely develops rheumatism until after starting school. Again, despite the importance of being at home, it is in August, during the school holidays, that the smallest number of fresh cases occur. Fresh cases reach a peak in September and again in January—times which "may correspond to the reassembly of children for the autumn and spring terms" (Hewitt and Stewart, 1952).

It has long been known that rheumatic fever often follows a sore throat and that the likelihood of attacks is perhaps greater after two infections at a relatively short interval. Although the respiratory infection may be so mild as to be symptomless, immunological tests will confirm that there has been infection with a Group A haemolytic streptococcus. When there is a marked difference in the incidence of rheumatic fever in different parts of a country, the frequency is related, not to climatic factors, but to the incidence of other streptococcal infections such as scarlet fever (Schwentker, 1952). Infection with a haemolytic streptococcus is a factor of proved significance in the production of the rheumatic state.

Some families seem peculiarly susceptible to disease of the upper respiratory tract. I know a family in which, early in life, each child in turn has suffered from recurrent otitis media; as they grew older the children have had sore throats and perhaps scarlet fever; the parents have had repeated tonsillitis or sinusitis. The pattern of disease in each individual seems to change with the passage of the years, but there can be very little doubt that it is due to a haemolytic streptococcus. We know very little about the natural history of this infection, especially in infants—yet it is common enough. Rantz and his colleagues (1952), for example, showed in an urban out-patient practice that 6% of infections during the first year of life were due to this organism.

The spread of streptococcal infections in the home is already being investigated by general practitioners (E. Tuckman, 1953, personal communication), but there is room for more work in this field. If we could learn how to recognize the clinical manifestations of mild streptococcal infections in persons of different ages it would be possible to compare the behaviour of streptococcal infections in rheumatic and non-rheumatic families, and to see whether infection of a pregnant woman has any bearing on the susceptibility of her child to rheumatic fever. Taran (1953) maintains that the susceptible child in a rheumatic family can be recognized even in infancy, because it takes unusually long to throw off upper respiratory infections, it is pale, and it is difficult to interest in food. It gets attacks of abdominal pain and is capricious and irritable, particularly towards the end of the afternoon. But this is a picture of almost any city infant.

To be able to recognize streptococcal infections by clinical methods would be a big step towards the elimination of rheumatic fever and of acute nephritis.

Prevention of Rheumatic Fever

The prevention of rheumatic fever needs to be considered under two headings—the prevention of the initial attack and the prevention of relapses in those who have had rheumatism.

In a rheumatic family, children not yet affected by rheumatism can be protected by antistreptococcal agents such as sulphadimidine or penicillin, given either continuously in small doses or in larger doses at the time of exposure to infection. Continuous administration has its disadvantages—the danger of toxic reactions and the emergence of organisms resistant to the drug. On the other hand, intermittent therapy demands (what may still be impossible) the early recognition of streptococcal infections and the immediate and vigorous treatment of all affected members of the household.

Once rheumatic heart disease has been acquired it tends to be progressive. It has not yet been established that control of streptococcal infection will prevent this progress once it has started, although it may well be that it does. Certainly it is reasonable to use treatment known to prevent streptococcal invasion of the nasopharynx and, for a child with rheumatic carditis, to accept the risks of continuous use of sulphonamides in doses of about 0.5–1 g. daily (Coburn and Moore, 1939; Hansen *et al.*, 1942), or penicillin (Gale *et al.*, 1952; Rammelkamp *et al.*, 1952). For this purpose injection of a repository preparation such as benzathine penicillin has much to recommend it, given in a dose of 600,000 units once every two to four weeks during the autumn and spring terms (Fletcher and Knappett, 1953). Continuous therapy depends for its success on the intelligent co-operation of the parents, and the first sulphonamide trial conducted in Birmingham by Dr. K. D. Wilkinson was abandoned. Oral penicillin (benzathine penicillin) should be given in curative doses, 300,000 units five times a day, for at least five days after the start of a respiratory infection or exposure to a sore throat.

Subacute Bacterial Endocarditis

The other important use for antistreptococcal agents in children who have rheumatic or congenital heart disease is to prevent subacute bacterial endocarditis. This is almost always due to *Streptococcus viridans*, which enters the blood stream from diseased teeth. The dangers of the condition require no emphasis; it is extraordinary that there should be such reluctance to advise dental extractions. The deciduous teeth of children with Fallot's tetralogy are especially liable to decay. In children with heart disease the milk-teeth must not be allowed to rot. In my experience subacute bacterial endocarditis is quite often due to infection in the deciduous teeth. If conservative methods fail to stop the spread of caries, extractions should be advised, using penicillin cover. For this purpose 300,000 units of procaine penicillin should be injected on the day of extraction and for the next four days. The child should then be seen at least once a month for six months; sweats, tiredness, pallor, and general malaise should be regarded with deep suspicion.

Some Points in Management

Exercise.—Children with congenital heart disease are more likely to suffer from too much restriction than from too much freedom. Recently we admitted a child of 8, still on the bottle and not allowed to walk. This was corrected while she was in hospital and operative treatment was highly successful. She then went for a year to a residential home, where activity was encouraged and progress was rapid. Shortly after the child returned home the almoner called and found her once more confined to bed by a mother who was unwilling to relax restrictions for which there had never been any need. These children will stop exerting themselves when they have had enough; there is usually no need to set limits for them. The case is different for children with rheumatic heart disease. A boy who has been well until his attack at the age of 10 has already learnt to enjoy the element of competition which is part of school life. For him restrictions will be needed, and a year in a residential rheumatic school, where return to activity is carefully graded, will introduce him in a more pleasant way to what may have to be a lifetime of restriction.

Education.—Children with congenital heart disease are of average intelligence, although they may seem stupid because they have never been given a chance to learn. No doubt it is because both parents and teachers expect these children to die suddenly that it may be difficult to convince them that school is a good thing, and that, as a general rule, the childhood infections will be surmounted with little disturbance. The children should attend an ordinary school if it is at all possible, for they will depend on their mental powers for a livelihood. They may not be able to play games; but only if they are greatly limited in their exercise tolerance should they be sent to a school for physically handicapped children before first being tried at an ordinary school. If operation is going to be necessary, it is an advantage to get it over before serious schooling begins. When a child is confined to bed for a long time learning is still important, and the education authority can sometimes provide the services of a home teacher.

Conclusions

This has been a sketchy review of a vast subject. I have attempted not so much to give information as to stimulate an interest in what is not yet understood. Progress has been made towards discovering the cause of heart disease in childhood, but much remains to be done. Because the problems are those of the home—the mother and her family, the infant, and the young child—no one should be better able to find the answers than the general practitioner.

What is the relative incidence of congenital heart disease and juvenile rheumatism? What more can be learnt about pregnancy and the cause of heart disease in children? What part does heredity play? What are the clinical manifestations of streptococcal infections? How should the spread of streptococcal infection be controlled? Can anything further be done to reduce the incidence of heart disease in childhood?

Because these are unanswered problems no guidance can be given to those who aspire to solve them. No one can tell what to look for or what is important. Perhaps something might be discovered by the joint efforts of general practitioners, making regular monthly visits to selected homes—not a hurried coming and going, but with leisure to sit and talk, to make friends, to discuss, to help and to learn, and especially to observe and to record. Observations might be so indefinite as to be valueless, but perhaps after analysis and correlation they might point to some new factors at present unrecognized, and there would at least be the satisfaction of taking more interest in the "beginnings" and not merely the "ends" of heart disease.

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A NEW TABLET TEST FOR BILIRUBIN IN URINE

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This paper describes a simple method for the detection of small amounts of bilirubin in the urine. Bilirubin is first concentrated by adsorption on a special test mat and then allowed to react with a stable diazonium compound incorporated in a tablet. Results obtained with urine from normal and jaundiced subjects have been compared with those using two standard routine methods for urinary bilirubin, Fouchet's test and the iodine ring test.

Methods

The *tablet test* is performed as follows: (1) Place 5 drops of urine on the test mat, which is 19 mm. square and 2 mm. deep, and is composed of a mixture of asbestos and cellulose fibres. (2) The tablet is placed on the centre of the moistened area of the mat. It contains a stable diazo dye (*p*-nitrobenzene diazonium *p*-toluene sulphonate) and also sulphosalicylic acid, sodium bicarbonate, and boric acid. (3) Two drops of water are allowed to flow on the tablet. (4) The colour developing on the mat is recorded within 30 seconds. The bilirubin is concentrated on the test mat. The diazo dye is taken into solution by the water, aided by the effervescence caused by the presence of sulphosalicylic acid and sodium bicarbonate in the tablet; the boric acid is a vehicle. If bilirubin is present in the urine the mat around the tablet turns purple and the amount of bilirubin is roughly proportional to the speed of development and intensity of the colour. Any colour developing after 30 seconds is ignored. It is found that the most satisfactory colour reaction is given if the first drop of water is allowed to remain on the tablet for a few seconds before the second drop is put on to wash the fluid on to the test mat.

Fouchet's test is performed by adding 2 ml. of 10% barium chloride to 10 ml. of urine, filtering and adding Fouchet's reagent to the filter paper. A positive result is indicated by a green colour.

The iodine ring test is performed by layering 2 ml. of tincture of iodine diluted 1 in 4 with water on to 10 ml. of urine in a test-tube. A positive result is indicated by a green ring at the interface.

A modification of the tablet test has been employed, using 5 drops of urine on the test mat as before, but replacing the tablet with 1 drop of Fouchet's reagent. A positive result is indicated by the development of a green colour on the mat.

Quantitative urinary bilirubin estimations were performed by the method of Golden and Snavely (1948). Urinary urobilin and urobilinogen were tested qualitatively by Schlesinger's test with alcoholic zinc acetate and by Ehrlich's aldehyde reagent. Serum bilirubin levels were estimated by the method of King and Coxon (1950).

Materials

Samples of urine from 100 non-jaundiced patients picked at random from the wards of a general hospital and 200 urines from jaundiced patients were tested. Thirty-six urines containing urobilin or an excess of urobilinogen but no bilirubin were also studied. In 92 instances the serum bilirubin level was estimated at the time of testing the urine.

Specificity

The 100 urines from non-jaundiced patients were tested to determine whether false-positive reactions might result from the administration of drugs or from the presence of other abnormal substances in the urine. The patients were receiving many varied forms of treatment and suffering from a wide range of disorders. In no instance did the urine give a positive tablet reaction, and it therefore seems unlikely that false-positive reactions occur owing to the presence of commonly administered drugs in the urine. Sometimes there was seen on the mat a faint orange-brown colour which became more conspicuous after the mat had been standing for some time. This colour did not interfere with the reading of the test, and was presumably due to the presence in the urine of diazotizable non-bilirubin chromogenic material.

The presence of urobilin or an excess of urobilinogen in the urine does not give a false-positive result, for 36 urines with a positive Ehrlich or Schlesinger reaction were negative both by the tablet test and by Fouchet's method.

These results agree with those previously reported with the tablet test. Free and Free (1953) tested approximately 2,000 urine samples from general-hospital patients and failed to find any substance giving false-positive reactions. They also tested 100 urine samples from normally healthy adults; 99 gave negative reactions and one an unexplained trace reaction. Klatskin and Bungards (1953) found two false-positive tablet reactions in a series of 478 urines, and in both these instances there might have been some hepatic dysfunction. Giordano and Winstead (1953) found that the presence of increased amounts of urobilinogen in the urine did not mask the colour reaction as it did in the Harrison spot test, in which Fouchet's reagent is used.

Sensitivity

Of the 200 urines tested which gave either a positive Fouchet or a positive tablet reaction, 185 were positive for both methods; 192 gave a positive Fouchet and 193 a positive tablet reaction, while only 135 were positive with the iodine method.

Ninety urines giving a positive tablet reaction were also tested with the modification using the test mat and replacing the tablet by Fouchet's reagent: 58 gave a positive result and 32 a negative one.

These results suggest that the tablet test and Fouchet's method are of about equal sensitivity and are considerably superior to the iodine ring test and to the modification for the detection of bilirubin in the urine. Other workers found that the tablet test was more sensitive than methods using Fouchet's reagent (Klatskin and Bungards, 1953; Giordano and Winstead, 1953).

Quantitative analysis of bilirubin in urine is made difficult by the presence of interfering substances. However, an attempt was made to compare the quantitative urinary bilirubin values with the results for the qualitative tests. Eighteen urines were analysed and then diluted serially, and the lowest concentration giving a positive qualitative reaction was recorded (Table I). Although the results varied, the tablet test could usually detect bilirubin between 0.1

and 0.15 mg. per 100 ml. The Fouchet method was only slightly less sensitive, usually detecting concentrations between 0.15 and 0.20 mg. per 100 ml. The iodine method was always less sensitive than the other tests, and usually over 1 mg. per 100 ml. was needed for a positive result. The sensitivity did not alter with the cause of the bilirubinuria, whether due to obstruction of the bile passages, to infective hepatitis, or to portal or biliary cirrhosis.

These results agree well with those of Sobotka and his co-workers (1953), who found that the lowest concentration of urinary bilirubin giving a colour varied from 0.04 to 0.1 mg. per 100 ml. Free and Free (1953) stated that 0.1 mg. of bilirubin per 100 ml. of urine usually gave a positive result. Klatskin and Bungards (1953) found that the first definite colour change was at 0.05 mg. per 100 ml., but 0.9 mg. was needed for a definite positive. These workers found that albumin in the urine would interfere with the sensitivity of the tablet test. This finding could not be confirmed in the present study.

TABLE I.—*Comparison of the Test Results with the Quantitative Analysis of Urinary Bilirubin*

Diagnosis	Undiluted Urine Bilirubin (mg./100 ml.)	Lowest concentration of bilirubin (mg./100 ml.). in diluted urine giving positive test		
		Tablet	Fouchet	Iodine
Obstructive jaundice	8·5	0·13	0·27	4·25
Infective hepatitis	8·2	0·06	0·06	2·05
,, ,,	7·6	0·05	0·11	1·90
Cirrhosis	6·2	0·10	0·10	3·10
Obstructive jaundice	5·8	0·09	0·18	Neg.
Infective hepatitis	3·2	0·40	0·40	3·20
,, ,,	3·0	0·09	0·18	0·75
Obstructive jaundice	2·5	0·31	0·62	1·25
Subacute hepatitis	2·4	0·15	0·15	1·20
Cirrhosis	2·3	0·07	0·14	2·30
Obstructive jaundice	1·4	0·17	0·17	Neg.
Infective hepatitis	1·1	0·14	0·07	1·1
Obstructive jaundice	1·0	0·50	Neg.	Neg.
Cirrhosis	1·0	0·12	0·06	,,
Obstructive jaundice	0·9	0·06	0·11	0·90
Cirrhosis	0·9	0·22	Neg.	Neg.
Obstructive jaundice	0·7	0·02	0·04	,,
Cirrhosis	0·13	Neg.	Neg.	,,

Relation to Serum Bilirubin Level

Simultaneous serum bilirubin estimations and urine tests were performed on 92 occasions. In every instance the serum bilirubin level was greater than 1 mg. per 100 ml. (Table II).

TABLE II.—*Comparison of Urinary Test Results with the Simultaneous Serum Bilirubin Concentration*

	Serum Bilirubin (mg./100 ml.)		
	1–3·0	3·1–5·9	>6·0
No. of urines tested	23	19	50
Tablet positive	10	15	49
Fouchet ,,	10	14	49
Iodine ,,	2	7	47

Clinical icterus is apparent at 2 to 3 mg. of serum bilirubin per 100 ml., and at this level the tablet and Fouchet reactions may or may not be positive while the iodine reaction is usually negative. Even at values of 3 to 6 mg. per 100 ml. all these methods may give negative results. At serum bilirubin levels above 6 mg. per 100 ml. the reactions were usually positive.

The failure to detect bile pigment in the urine at low serum bilirubin levels can be attributed to the small number of patients with early infective hepatitis included in the series. In these subjects bilirubin occurs in the urine at low serum bilirubin levels. Cases of obstructive jaundice with low serum bilirubin values were also few in number. The majority of the patients studied when their serum bilirubin value was low were recovering from infective hepatitis, in which disease bilirubin is known to disappear from the urine in the presence of a raised serum bilirubin level.

For the early detection of bilirubin in the urine in the jaundiced subject the tablet test is at least as good as Fouchet's method. The iodine method is not sensitive enough to justify its continued routine performance in ward side-rooms. The modification with the mat and Fouchet's reagent but no tablet is superior to the iodine ring method although inferior to the usual Fouchet's method and to the tablet test.

Summary

A new tablet test for urinary bilirubin is described which is specific for bilirubin, and of at least equal sensitivity to the Fouchet test while being quicker and easier to perform. The iodine ring test is of little value as a method of detecting small amounts of bilirubin in the urine.

We wish to thank Mr. J. A. Bunce, of Don S. Momand Ltd., who provided the tablets and test mats for the trial, and Dr. B. H. Billing for the quantitative urinary bilirubin estimations.

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Medical Memoranda

Scrotal Pneumocele Complicating Induction of Artificial Pneumothorax

Although several cases of scrotal pneumocele complicating artificial pneumonperitoneum have been reported it has not been possible to find any report of this occurring as a complication of artificial pneumothorax treatment. The following case is therefore recorded.

CASE REPORT

A man aged 40 was admitted to the London Hospital Annexe on March 17, 1952, with advanced bilateral pulmonary tuberculosis, and a previous history of a right inguinal herniorrhaphy some 25 years before. After treatment with bed rest and full courses of chemotherapy it was decided to attempt to induce a right artificial pneumothorax, although at the time it was realized that this might not be possible as extensive adhesions were to be expected.

Induction of a right artificial pneumothorax was carried out at 2 p.m. on December 17. The initial intrapleural pressures were −11 and −3 mm. of water, and there was a free rise and fall in the manometer. 350 c.cm. of air was introduced, the final pressures being −11 and 0 mm. of water.

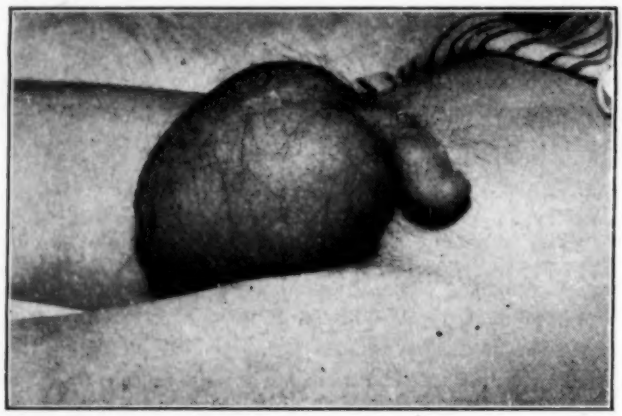
During the course of the induction the patient had an attack of coughing, but did not complain of any difficulty in breathing or of pain, and there was no surgical emphysema at the completion of the induction. Shortly afterwards another bout of coughing began, again with no distress, but this time it was accompanied by the appearance of minimal surgical emphysema around the site of the injection. The cough was settled by the administration of linct. terp. heroin co., 1 dr. (3.5 ml.), and no more surgical emphysema developed.

However, at 9 p.m. another bout of coughing began, accompanied by some slight breathlessness. The patient went to sleep after this, but awoke at 11 p.m. to find that his scrotum was distended but not painful. On examination he was not distressed or dyspnoeic. Other than a small collection in the right axilla, surgical emphysema was minimal down the right side of the trunk and along the line of the right inguinal canal to the right side of the scrotum, which was distended to about 5 by 3 by 2 in. (12.5 by 7.5 by 5 cm.).

The patient was sedated and slept well, but by 10 a.m. the next morning surgical emphysema was extensive in the right axilla and the right side of the chest, pitting up to about 1 in. (2.5 cm.). It was minimal in the neck, but

extended down the right side of the trunk from 2 in. (5 cm.) behind the posterior axillary line forward to the midline and down to about 1 in. below the right inguinal ligament. There was a bilateral rounded swelling of the scrotum measuring some 6½ by 5½ by 4½ in. (16.5 by 13.9 by 11.4 cm.) (see illustration). The swelling was tense, cystic, non-tender, resonant on percussion, and highly translucent. It was irreducible and there was no cough impulse. What was thought to be the most characteristic physical sign was the high-pitched squeak, like that obtained from a rubber balloon, emitted on stroking firmly with the fingers. No crepitus was elicited over the scrotum. The testes were not palpable nor were they revealed by transillumination. Surgical emphysema extended back to the perineal body and was also found along the penis. It should be noted that the scrotum alone contained about three times the volume of air used at the induction. This suggests that the induction was followed by a spontaneous pneumothorax, or that, owing to diffuse pleural fusion, the needle had punctured the lung.

An *x*-ray film of the chest showed no evidence of air in the pleural cavity or mediastinum, but considerable pool-



ing of air between the muscle layers. The fibres of the pectoralis major muscle were clearly defined owing to infiltration of air between them. *X*-ray examination of the abdomen showed similar collections of air between the muscle layers, and the right kidney was clearly outlined, proving the presence of air in the retroperitoneal plane. An *x*-ray film of the scrotum showed the septum clearly defined between collections of air in each scrotal compartment, the testes being pushed well up into the groins.

No treatment was given, as the condition was causing no distress, but the swelling persisted for more than three weeks.

COMMENT

The interest in this case lies in the fact that no reference has been found in the literature to the occurrence of scrotal pneumocele as a complication of pneumothorax treatment. Distension of the scrotum with air has been reported as a sequel to diverticulitis of the colon with perforation (Rankin and Judd, 1922) and as a complication of pelviolithotomy (Counseller and Butsch, 1935). Wynn-Williams (1949) suggests that scrotal pneumocele as a complication of artificial pneumoperitoneum is more common than previously thought. He reviews the literature and finds that ten cases have previously been reported. He adds a case of his own which was further complicated by a strangulated inguinal hernia. In this case a distended processus vaginalis was demonstrated at operation.

Most authors comment on the presence of crepitus in the scrotum, but in the case reported above this was absent and the "balloon" sound provided the most convincing sign of the presence of air in the scrotum. The demonstration of this physical sign to a hitherto mystified group of students immediately evoked the correct diagnosis. Another interesting feature of this case was the early inflation of the scrotum when there was relatively little surgical emphysema elsewhere. This may be related to the disruption of the tissue planes associated with the right inguinal herniorrhaphy.

I wish to thank Dr. Kenneth Perry for permission to publish this case, and Dr. C. M. Ogilvie for his advice and encouragement.

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Onchocerca Volvulus in a Paratyphoid Abscess

An African girl aged 14 was admitted to the Gold Coast Hospital, Accra, for investigation of pain in the right groin. She was found to have a slightly tender area on the inner side of the right thigh near the origin of the adductor muscles. For four weeks she had an irregular temperature with a varying leucocytosis, whilst the induration slowly progressed to a fluctuant abscess. There was no response to penicillin treatment.

The abscess was incised and yielded about 6 oz. (170 ml.) of pus, which contained fragments of an adult filarial worm. Dr. M. H. Hughes examined the pus and reported that it yielded *Salm. paratyphi C* in pure culture. The worm was thought likely to be *Onchocerca volvulus*, and Professor J. C. C. Buckley kindly confirmed this provisional identification.

In view of the finding of an adult *O. volvulus*, skin smears were examined on a number of occasions, but no microfilariae were detected. The patient made an uninterrupted recovery after evacuation of the abscess, and *Salm. paratyphi C* could not be isolated from her stools. She gave no history of a previous feverish illness which might have been paratyphoid C fever, although this is not an uncommon cause of fever in children in Accra.

COMMENT

Suppuration in onchocerca nodules and the presence of these worms in deep abscesses have not often been recorded in the literature. Roubaud and Jamot (1920) recorded a case of a large subpubic abscess from which at incision 10 entire male and five female worms were obtained. Rodhain (1920) considered suppuration in nodules rare and usually limited by the fibrous capsule. He described two cases of suppuration in superficial nodules, both with superficial ulceration. Chesterman (1932) mentioned that he had seen only one case of abscess formation. Strong *et al.* (1934) also described it as exceptional, and mentioned only one case of its occurrence, in a scalp nodule. Gabathuler and Gabathuler (1947), reporting on onchocerciasis in East Tanganyika, mentioned it as a possible cause of the deep-muscle abscesses seen so frequently there, and described finding an adult female worm in an abscess on a rib of a patient showing multiple muscle abscesses.

The interesting features of the present case are the negative skin tests, absence of nodules, the finding of only one worm, and the unusual nature of the infecting organism. It is also curious that the site should have been the same as that of one of the few previously described cases. It remains to conjecture whether the presence of the worm in the abscess was purely coincidental, or whether, alive or dead, it provided the nidus for the infecting organism.

I am indebted to Dr. L. G. Eddey, Chief Medical Officer, Ministry of Health, Gold Coast, for permission to publish this report.

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Reviews

BIOCHEMISTRY OF GENETICS

The Biochemistry of Genetics. By J. B. S. Haldane, F.R.S. (Pp. 144. 15s.) London: George Allen and Unwin Ltd. 1954.

The enormous strides in biochemical genetics which have occurred since Garrod's *Inborn Errors of Metabolism* first excited interest in the subject have in recent years owed much to the introduction into biochemical investigation, by Beadle and Tatum, of the fungus *Neurospora* and its mutants. The induction of mutant strains of *Neurospora* and other micro-organisms by treatment with *x* rays, and the investigation of the metabolic abnormalities of the mutants, has thrown a flood of light on the genetic control of biochemical processes and has led to the rapid elucidation of intermediary metabolic steps in a detail which would otherwise have been difficult and slow of accomplishment. In this way examples of similarity in intermediary metabolism between higher animals and lower organisms have been enormously increased in number, and the idea that genes themselves control the synthesis of enzymes, which in turn control metabolic processes, has become extremely fruitful. For instance, as the result of these investigations it is not entirely fanciful to look on the dependence of the health of the human being upon the presence in the diet of certain vitamins and amino-acids as a result of mutation in the genes of our remote ancestors, whereby synthesis ceased of the enzymes responsible for the elaboration within the body of these particular foodstuffs. The loss of this anabolic power could be an advantage, rather than a disadvantage, if such foodstuffs were naturally present in the food in sufficient amount, since the energies of the cell so released could be directed to essential processes. It was only with the coming of civilization with a sophisticated desire for polished rice or white bread that the absence of ability to synthesize the B vitamins, present in the outer parts of the natural wheat berry or rice grain, began to reveal itself in disease. The effects of loss of such synthetic ability as the result of mutation might be neutralized, in civilized society, by industrial synthesis of the essential food factors, but such an artificial production is sometimes costly and we still frequently look to natural sources for our essential foodstuffs.

Professor J. B. S. Haldane was at one time Sir William Dunn reader in biochemistry in the University of Cambridge, with a particular interest in enzymes, a subject upon which, in collaboration with Professor G. E. Briggs, he published an important monograph 25 years ago. Subsequently taking up the question of the influence of enzymes on pigment formation in flowers, Haldane began the study of biochemical genetics in plants. With an ability and an equipment in mathematics which the French would describe as "formidable," Haldane perhaps naturally found himself developing into the internationally distinguished geneticist that he has become. Fortunately he has not lost his interest in biochemistry, and the book under review is based on lectures given in the Department of Biochemistry, University College, London, in 1950 and 1952. It is therefore written for biochemists rather than for geneticists. The knowledge of biochemistry which the reader is assumed to possess is small, however, and he is aided by an appendix which contains the structural formulae of many of the substances of biochemical influence considered in the text.

After an introductory chapter giving the elements of genetics, the author discusses the genetics of antigens. He then considers in succession the biochemical genetics of fungi, yeasts, bacteria and viruses, higher plants, and higher animals including man. The question of extranuclear influences on biochemical activity, including training, is then discussed and the problem of gene reproduction and mutation considered. The conclusion drawn is that genes control biochemical processes, the control generally being remote, as, for example, through enzymes synthesized wholly or in part by the genes in question. The tentative deduction is discussed that "gene" is the name given at any moment to a part of a chromosome with a specific function. Although the "immortality" of genes is to Lysenko an essential of "Mendel-Morganism," Haldane points out that genes are destroyed at every nuclear division. "To what extent genes are altered as a result of changed metabolic processes is a question of fact, and not of principle. My own opinion is that they are surprisingly stable in this respect" (p. 111). He suggests the interesting possibility that the "same" gene can be represented in nucleic acid or in protein, as the same photograph can be represented by a positive or a negative print.

In his discussion of the cause of those mutations which are of such importance in evolution, Haldane concludes that, since the rate of spontaneous mutation in *Drosophila* is markedly affected by temperature, while mutagenesis by *x* rays is not, natural radioactivity and cosmic rays can account for only a small fraction of natural mutation. The chemical mutagens, which possess properties of great potential significance, are discussed in a most lively fashion, and the possible relationship between mutagenesis and carcinogenesis touched upon.

Among his tentative conclusions he mentions the possibility that the naturally enhanced interest in geriatrics will confirm his earlier suggestion that "natural death" is largely due to lethal genes acting so late in life as to be almost immune to natural selection. If this turns out to be so, we shall naturally take a deeper interest in the innate biochemical differences which lead to the development of arteriosclerosis, various forms of cancer, and other diseases of old age.

To the medical man who wishes to know about some of the researches and ideas of a most fertile mind in the field of biochemical genetics this book may be confidently recommended.

F. G. YOUNG.

DISEASES OF WOMEN

Diseases of Women. By Robert James Crossen, A.B., M.D., F.A.C.S. Tenth edition. (Pp. 935; 990 illustrations, including 41 in colour. £6 15s.) London: Henry Kimpton. 1953.

In 1907 the first edition of this now famous textbook was published, and after nine reprints of the ninth edition (first printed in 1941) Dr. Robert Crossen has now released the new tenth edition. Although he has participated in editing the book since 1930, this is the first time he has accepted full responsibility for it, and the success he has achieved will be widely acclaimed. It is a worthy memorial to Dr. Harry Sturgeon Crossen, the original author, to whom the following fine tribute is paid: "The quality of his life, the keenness of his mind, the skill of his hands inspired and challenged his students, his fellow physicians, and all whose lives he touched."

In just under 1,000 pages, with nearly the same number of carefully selected and beautifully produced illustrations, a tremendous wealth of information is presented clearly and attractively. Relevant literature has been summarized in the text, and a valuable feature of the book is the list of up-to-date references at the end of each section. The importance of psychosomatic medicine in gynaecology has not been overlooked, and careful attention has been given to the discussion of psychic changes occurring in association with the physical development of puberty and adolescence. The effect that skill and sympathetic handling of emotional factors can have in reducing morbidity both at the time and in later years is emphasized: "One must always remember that there is an organ above the neck called a brain and that it has been active since early childhood. In fact, in childhood it probably received its most vivid and important impressions, which will determine the attitude of its owner for life. Is there any reason why it is less important to learn that Mary Smith acquired a lasting hate for men because she was treated cruelly by a drunken father than to learn that she had measles, mumps, and chickenpox before the age of 10?"

It is encouraging to record the attention given in a gynaecological textbook to both premarital advice and marriage guidance. The author believes that inadequate marital adjustment is a source of trouble in about one-third of all gynaecological patients.

A valuable section on the endocrinology of the ovarian cycle is contributed by Dr. Willard Allen; it includes an excellent summary of the history of the subject. The malignant uterus is discussed in considerable detail, and an interesting historical reference is the reproduced editorial written by Dr. Harry S. Crossen in 1934 for the *American Journal of Surgery* on the subject of the treatment of carcinoma of the cervix. This wise and statesmanlike article, with its keen appreciation of matters both technical and human, could be read and re-read to-day with profit by all gynaecologists and radiotherapists. In the subsequent text reference is made to Taussig's lymphadenectomy and to the use Meigs makes of this in association with the radical hysterectomy operation.

The pathological museums of Vienna have specimens showing that Wertheim knew the importance of removing glands from the pelvic wall. The Wertheim operation as advocated and practised by Bonney in Great Britain, America, and elsewhere included removing the glands, and it would be a matter for regret if a textbook as generally accurate and as excellent as this should continue to perpetuate the mistaken belief that the so-called new surgical attack on carcinoma of the cervix was radically different from the original methods devised in the Old World. It is also a little surprising that in this section there is no reference to the combined attack on carcinoma of the cervix by irradiation and radical hysterectomy as practised by Schlinck, of Sydney, and by certain clinics in Great Britain. £6 15s. is a considerable sum for a student or young graduate in this country to pay for a textbook in gynaecology, but if the book is regarded as an investment it will pay a rich dividend.

J. STALLWORTHY.

HOSPITAL ACCOUNTS

Hospital Accounts and Financial Administration. By Captain J. E. Stone, C.B.E., *M.C.*, F.S.A.A.(Hons.), F.H.A. Foreword by the Rt. Hon. Iain Macleod, M.P. Introduction by Sir Edward Peacock, G.C.V.O. Third edition. (Pp. 866; illustrated. £6 6s.) London: Faber and Faber Ltd. 1954.

This is a valuable book of reference for all engaged in hospital administration. It is likely also to be a main textbook for prospective hospital finance officers and other lay hospital administrative officers. The first 250 pages deal ably with general accounting and miscellaneous matters related to hospital accounting. Then comes a very important 60-page section on financial control, described by the author as "unity of control exercised by the chief financial officer under the direction of the finance committee." This section merits the careful attention of hospital doctors, who could learn from it that "the financial organization is not intended to put a drag on the wheel of progress in the work of any department, but to ensure that the hospital gets equivalent value for all its expenditure" and that "if a hospital organization is to work smoothly and efficiently and to be wisely directed the functions of the administrative and of the financial side must be carefully harmonized." Pages 301 to 502 deal with finance and accounting under the National Health Service Act, 1946, and are mainly factual. Pages 505 to 618, the most important part of the book, give Captain Stone's recommendations for a departmental system of hospital accounts in which "each department is charged with the expenditure it incurs to maintain its service," with the result that, "as each department is subject to the control of a responsible officer, responsibility for increases and decreases is readily traced and brought to the notice of the officers primarily responsible." Three important reports on this subject have been issued recently, and the Minister of Health has set up a working party which will, he trusts, "be able to devise a practical system of departmental and unit costing, supplementary to the existing subjective analysis of expenditure in accounts." It will be interesting to compare Captain Stone's recommendations with those of the working party.

The remaining quarter of the book has a short section on the National Health Service (Scotland) Act, 1947, and a collection of appendices and forms which make it a veritable mine of information.

Altogether this is a necessary book for every hospital library, though it will date rapidly.

W. G. PATTERSON.

A RESEARCH LABORATORY

History of the Laboratory of the Royal College of Physicians of Edinburgh. By John Ritchie, F.R.C.P.Edin. Foreword by W. A. Alexander, P.R.C.P.Edin., 1953. (Pp. 159+xi; 8 illustrations. 15s.) Edinburgh: Royal College of Physicians. 1953.

In Britain 80 years ago there were few laboratories for research and none for bacteriological research. In 1887, largely at the instigation of Dr. (afterwards Sir) Batty Tuke, the Royal College of Physicians of Edinburgh decided to found "a laboratory for the prosecution of original research," an act of scientific initiative which one does not always expect from old foundations. This laboratory though it passed through many trials and tribulations, continued its useful work until 1950, when it finally closed its doors. It is of interest to note that at its foundation the decision was taken that "the whole yearly expenditure, including the rent of the premises and the salary of the superintendent, shall not exceed the sum of £650." At first the laboratory was willing to undertake almost any kind of research, for in 1895 a subject for investigation was "the life history of salmon especially in regard to physiological changes associated with their migration." As time went on the fields of research were chiefly bacteriological, histological, nutritional, and chemical. We note that for one of the researches into nutrition the investigators were fortunate in having the willing co-operation "of a gentleman who was convinced that the less a man ate the stronger and healthier he became." After living on bananas and water for five days this gentleman's opinion changed to the extent that he appreciated some bread-and-butter.

There were times when the amount of routine work done in the laboratory encroached upon the time needed for research, but very valuable work was done. The names of James Ritchie, Noel Paton, James Walker Dawson, A. G. McKendrick, and W. O. Kermack sufficiently testify to the high standard of the work which emanated from the laboratory. Moreover, in the history of scientific research there are few more inspiring examples than that of Kermack, who was not daunted by the accidental loss of his eyesight but continued his researches and later won the coveted Fellowship of the Royal Society. It is good to know that he still continues his work at Aberdeen.

The last 40 pages of the book are occupied by a formidable list of books and articles published as the result of work done in this famous laboratory. It is an impressive record.

ZACHARY COPE.

Rheumatoid Arthritis. A Handbook for Patients (illustrated by Leslie Starke), published by the Empire Rheumatism Council for free distribution, is another, and excellent, attempt to assist the educated individual in the understanding of rheumatoid arthritis, whether they be patient or a relative of someone suffering from the condition. The sound advice dispensed in the booklet is leavened and rendered much more digestible by the brilliant illustrations of Leslie Starke. The "Questions and Answers" introduce a contradictory note, and it is suggested that in future editions this section be deleted or the general format altered so that the subject is approached throughout as question and answer. Though primarily intended to be given to the patient by his doctor, many members of the profession would benefit from the careful perusal of the booklet. The Empire Rheumatism Council is to be congratulated on the production of a most useful educational guide.

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A NEW OUTLOOK ON IMMUNITY

During his recent visit to Europe Sir Macfarlane Burnet gave several lectures, one of which we are privileged to publish in the opening pages of this issue. This is not an account of the author's own work in his recent chosen field, but of developments of profound significance for those gifted to see it in a broader subject, that of immunity in general. Probably few of the profession as a whole have heard of the recent observations on which this lecture is mainly based, and still fewer will already have related and interpreted them as they are here set forth.

The initial step in the argument is the recognition of a dual function in the reticulo-endothelial system and any other cells concerned in the immunity mechanism. This system is responsible for removal by phagocytosis of any foreign material, whether particulate or in solution, and whether consisting of micro-organisms or, for example, foreign red cells. When any such material is in fact foreign its removal is followed by antibody formation, and so far as infective disease is concerned this process is responsible for recovery and subsequent immunity. On the other hand, the same system is responsible for the phagocytosis of "expendable" cells within the body, among which the turnover is most rapid in the red cells, and from this process no antibody formation results. The question posed is: How does this system distinguish between home-produced and foreign material, or between "self" and "not-self"?

This is a question to which it might seem less important to find an answer had it not now been shown that the capacity so to distinguish is only acquired at a late stage of intrauterine life. There are four items of proof that the early foetus does not recognize foreign material as such, and reacts to it in a totally different way, becoming permanently tolerant instead of actively antagonistic. Two of these concern the existence of mixed blood groups in twins which may be presumed to have had communicating placental circulations. This condition was first observed in cattle, and has recently been unexpectedly confirmed by the discovery of a woman with blood containing both A and O cells, whose twin brother died in infancy. Another piece of evidence comes from the field of microbic infection: in Traub's experiments with the virus of lymphocytic choriomeningitis in mice, intrauterine infection resulted in the birth of apparently healthy offspring whose tissues all contained large amounts of the virus, but with no evidence of any reaction to it by way of either tissue changes or antibody formation. Lastly, the brilliant experiments of Medawar and his colleagues have confirmed the same thesis in connexion with tissue grafts. If a mouse foetus is given an injection *in utero* of a suspension of spleen or other tissue from another strain of mice a graft of skin from that strain will later take, although in the unprepared animal it will, of course, provoke an immune reaction and undergo necrosis after only a few days. Similar experiments in these authors' hands were successful in chicks after inoculating eggs with cell suspensions from other strains of bird. Colour photographs of these creatures with patches of fur or feathers of an alien colour are among the strangest scientific curiosities of recent years. It is perhaps not surprising that in early development foreign cells are not recognized as such, but it is much more remarkable, and calls for more ingenuity in explanation, that their introduction should lead to lifelong tolerance.

Burnet both proposes a possible mechanism by which this behaviour can be explained and offers some suggestions about the bearing of these phenomena on practical medical problems. Exponents of several branches of surgery will find food for thought in what he has to say about tissue grafting, and in particular about the distinction between the eye and other organs and between "expendable" and other cells. The physician and epidemiologist will find a hypothesis in explanation of serum hepatitis—namely, that intrauterine infection with this virus may result in a condition corresponding to symptomless congenital lymphocytic choriomeningitis virus infection in mice. There are possible implications in this hypothesis, not further developed in the lecture, of even deeper significance. If a pathogenic micro-organism can subsist indefinitely in the body without at any stage causing damage, may it not be that some of the manifestations of infective disease are due not to microbic activity but to an over-reaction to it on the part of the body? This could obviously not explain the results of infection with bacteria forming exotoxins, but it has already been suggested in connexion with some aspects of the tuberculous process and might well be a factor in infections of other kinds. Finally —and this may not be altogether unconnected with what goes before—Burnet deals briefly with the important possibility that microbic products may

function as haptenes, thus leading to auto-antibody formation, a by no means unlikely explanation of such diseases as rheumatic fever and nephritis.

It is a great service to science to discover new facts, but a breadth and philosophy of outlook which can use disconnected observations to formulate a fresh approach to a fundamental problem requires greater gifts. It is from such definitions of present knowledge and its significance as those presented here that future progress will take its origin.

BLOOD-VESSEL GRAFTING

It was as long ago as 1912 that Carrel was awarded the Nobel Prize for his work on the transplantation of blood vessels. A year later Lexer reported[1] that he had resected three aneurysms of peripheral arteries and restored continuity in each case with an autogenous vein graft. Between 1913 and 1949 a few successes were reported, but the method failed to be of use in either world war. In 1949 Gross, Bill, and Pierce[2] published their adaptation of Carrel's pioneer work to the treatment of coarctation of the aorta, and this awakened interest in the subject.

A segment of artery can be replaced by either an autogenous venous or a homologous arterial graft—that is, from another human being. The main advantages of autogenous veins are that they survive transplantation and an artery bank is not necessary; the main disadvantages are that they may rupture if inserted into the aorta or its major branches, and they are technically more difficult to insert than arterial grafts, particularly in patients with arteriosclerotic vessels. For these reasons the surgical unit at St. Mary's Hospital, which has experience of over fifty blood-vessel grafts, prefers vein grafts when the host's vessels are normal or nearly so,[3] and uses arterial grafts in arteriosclerotic patients and for lesions of the aorta and its major branches.

An arterial bank is an important part of such work. Vessels have been stored in various media in a refrigerator,[2 4] by chemical means,[5] by freezing at −20° C. or less,[6] and by freeze-drying.[7 8] Of these methods chemical preservation is the least satisfactory because it denatures the proteins; and storage in a refrigerator is possible only for a period of up to six weeks. Frozen storage provides grafts which have proved satisfactory after preservation for several years, and freeze-drying is even more convenient, because the grafts can be kept for years at room temperature and transported by the ordinary postal services.

The long-term results of blood-vessel grafting are now becoming apparent, and consequently the indications for this operation can be better assessed. Of the many factors concerned, two seem to be of prime importance—the size of the vessel to be grafted and the state of the recipient's arteries. The larger the artery, the easier it is to graft and the higher the success rate; grafts of the aorta rarely thrombose even when the host vessels are grossly abnormal. For a vessel the size of the popliteal artery the initial success rate is still high, but in experimental grafting of the greyhound's coronary artery only an occasional success can be obtained. The recipient's artery may vary from that of a healthy young soldier with a gunshot wound to that of an elderly patient with advanced arteriosclerosis. In the latter type of case the results have been governed by the patient's general disease, and the strictest criteria must be applied to the selection of patients for this operation. For patients with a coarctation of the aorta which cannot be repaired by direct suture an arterial graft is indicated. In war and civilian wounds of the major peripheral arteries a vein graft is the treatment of choice if direct repair is impossible. Aneurysms of the aorta, if they threaten the patient's life or if they cause sufficient symptoms, can be replaced by a blood-vessel graft if they are distal to the left common carotid artery. The success rate in these patients is not greatly influenced by the state of the host vessel, and arteriosclerotic, syphilitic, and mycotic aneurysms of the aorta and major peripheral arteries have been successfully treated by grafts. Occasionally a carotid body tumour or other locally malignant new growth may invade a major artery and a graft be needed to restore continuity of the blood flow. But the most important and at the same time the most controversial indication is obliterative vascular disease; this may take a variety of forms.

Primary thrombosis of a vessel such as the popliteal artery is uncommon, but when it does occur, and when severe symptoms persist after sympathectomy, a blood-vessel graft gives a good result. An old embolus, particularly in a patient who has had a successful mitral valvulotomy but retains symptoms such as intermittent claudication, may be an indication for a graft. Thrombo-angiitis obliterans is rarely, if ever, improved by this operation; the vessels affected are usually too small, and if large the disease is so active that a fresh thrombosis rapidly follows a successful reconstruction. Most patients with symptoms in their limbs due to senile obliterа-

[1] Lexer, E., *Verh. dtsch. Ges. Chir.*, 1913, **42**, 113.
[2] Gross, R. E., *et al.*, *Surg. Gynec. Obstet.*, 1949, **88**, 689.
[3] Rob, C., *British Medical Journal*, 1953, **2**, 308.
[4] Carrel, A., *J. Amer. med. Ass.*, 1908, **51**, 1662.
[5] Levin, I., and Larkin, J. H., *J. med. Res.*, 1909, **21**, 319.
[6] Hufnagel, C. A., and Eastcott, H. G., *Surg. Forum, Amer. Coll. Surg.*, 1950, p. 269. Philadelphia.
[7] Marrangoni, A. C., and Cecchini, L. P., *Ann. Surg.*, 1951, **134**, 977.
[8] Eastcott, H. H. G., *et al.*, *Lancet*, 1954, **1**, 1311.

tive vascular disease have a lesion in their arteries which is anatomically suitable for a blood-vessel graft, but in only a very small proportion is such an operation justified, for this is a general disease and the local effects have to predominate to an unusual degree for a purely local operation to be of benefit. Experience shows that an arteriosclerotic occlusion of the aorta or its bifurcation is often worth replacing with a graft, but this operation is only occasionally justified in a patient with an arteriosclerotic thrombosis below the level of the inguinal ligament.

In short, autogenous vein grafts should be used whenever possible; homologous arterial grafts are a satisfactory alternative, particularly for the aorta and its major branches. The results have been governed by the size of the artery and the state of the recipient's vessels, and for the treatment of an arteriosclerotic thrombosis the greatest care must be taken in the selection of patients.

TWENTY-FIVE YEARS OF THE R.C.O.G.

The Royal College of Obstetricians and Gynaecologists has been celebrating, with a little more than the usual satisfaction at such an event, its silver jubilee. It was in 1929 that the College, after a prolonged and difficult labour, attended by some (but not all) of the most eminent "man-midwives" in the country, came to birth; in 1932 it moved to its present house in the heart of medical London, and in 1938 it became a royal corporation. Of those associated with its foundation the dominant figure was William Blair Bell, of Liverpool, whose splendid portrait, presented by Lord Riddell, showing an ascetic and commanding countenance surmounting a gorgeous robe, looks down in critical appraisement upon the president's chair and dais in the Queen Anne Street house. Blair Bell was a man of vision and determination, energetic and impetuous; a man also with a great sense for tradition, ceremonial, and dignified display, which accounted for the fact that the new College bade fair to outshine in attire and regalia its venerable sisters in Pall Mall East and Lincoln's Inn Fields.

In addition to Blair Bell, the original committee which was set up in 1925 to explore the possibilities of such a foundation consisted of Sir Comyns Berkeley, of London, Sir Ewen Maclean, of Cardiff, and—happily still with us, the man who has been all along the College chief of staff, sponsor of its ceremonies, prompter of successive presidents, a president himself, and now the College historian[1]—Sir William Fletcher Shaw, of Manchester. There were five others who made up the nine signatories to the articles of association—Dr. H. Russell Andrews, Sir Francis Champneys, Dr. T. Watts Eden, Professor Munro Kerr, and Professor C. G. Lowry. Among the members of the first Council were Dr. J. S. Fairbairn, who succeeded Blair Bell as second president, Professor Beckwith Whitehouse, of Birmingham, Professor R. W. Johnstone, of Edinburgh, and Dr. Bethel Solomons, of Dublin. The present president of the College is Mr. A. A. Gemmell, and he has had seven predecessors, one of whom, Dame Hilda Lloyd, was the first woman president of any royal medical college. The College council has always had a woman member, Dame Louise McIlroy being the first.

The enhanced satisfaction evident at the celebrations last week (see p. 235) was inspired by the cordiality of the greetings which came from the senior academic bodies and the universities. It proclaimed the fact that the "three Royal Colleges" is now an accepted term, as indeed it has been for some years. But in its pre-parturition days the College encountered troublesome opposition from the older Colleges. This was forecast in a leading article in the *British Medical Journal* at the time which stated that it was not to be imagined that a College exclusively occupied with obstetrics and gynaecology would always find itself in accord with examining bodies whose interests were necessarily wider. But the writer went on to express the hope—which has been abundantly fulfilled—that harmony would be restored and conflicting views adjusted. The new College, he wrote, was animated by the single ideal of raising as high as possible the level of medical practice in all its branches.

The subsequent history of the College has shown that improvement in the care of mother and infant has been its first concern, and that matters relating to its own prestige and status have been of secondary importance. Among the varied activities undertaken to improve teaching and training in obstetrics and gynaecology, the College publishes the *Journal of Obstetrics and Gynaecology of the British Empire*, which has a world-wide reputation; and it is in the process of building up a museum which it is hoped will become the foremost of its kind in the world. It is some measure of the success of the College's work that a Commonwealth-wide appeal has now been launched for £400,000, which is the sum needed for the construction and maintenance of a building to meet the growing requirements of this young and vigorous body.

[1] *Twenty-five Years. The Story of the Royal College of Obstetricians and Gynaecologists, 1929-1954.* By Sir William Fletcher Shaw. London: J. and A. Churchill, Ltd.

SALICYLATES IN RHEUMATIC FEVER

For more than 75 years claims have been made for the value of salicylates in the treatment of rheumatic fever, yet conclusive evidence of definite antirheumatic activity—as distinct from antipyretic and analgesic action—has not been produced. Following reports by Coburn[1] and Manchester[2] on the value of salicylates in high dosage, Watkinson[3] produced strongly suggestive evidence that such dosage may reduce the duration of fever, arthralgia, and raised sedimentation rate more effectively than lower dosage. No difference could be shown in the incidence of carditis or the frequency of relapses. It is well known, however, that clinical signs of rheumatic activity may continue to appear despite adequate salicylate blood levels, as shown by Murphy,[4] but that such treatment is valueless cannot be deduced, for no control group was included in his series.

In 1948 Professor Illingworth and his colleagues started a well-controlled investigation of the value of salicylates in a group of 55 children aged 3 to 14, and the interim report has recently been published.[5] Alternate children fulfilling accepted criteria for diagnosis[6] were allotted to treatment and control groups respectively. Until signs of activity had abated all children were kept at rest in bed, and all received prophylactic sulphonamides or oral penicillin. The control group was given simple analgesics and the treated group was given enough salicylates to maintain a blood level of 30 to 40 mg. per 100 ml. until the sedimentation rate had been normal for two weeks (an average period of 65 days). Considerable difficulty was experienced in maintaining these blood levels because of toxic manifestations. A natural reluctance to deprive any child seriously ill of the possible benefit of salicylates led to the transfer to the treatment group, in the first week in hospital, of two new cases suffering from pericarditis. One child, whose condition deteriorated markedly after beginning on salicylates, was withdrawn from the trial to be given corticotrophin. Three other children from the control group were given salicylates but were excluded from assessment from the time of therapy.

Statistically significant results in favour of salicylates in high dosage were shown by the more rapid fall of sedimentation rate and temperature of the treated children. In the control cases the sedimentation rate fell more slowly in those cases of long duration, whereas in the treated cases the rate of fall was not influenced by the duration of symptoms before treatment began. This is not in keeping with the idea that salicylates are of value only if given early in the attack. Surprisingly, no real difference in the duration of arthritis was noted between treated and control groups, and though recurrences were fewer in the treated cases the numbers are too small to be significant. Fewer children in the salicylate group developed new rheumatic manifestations, and the impression gained at the last examination at an average of 32 and 31 months after admission in the control and treated groups respectively was that the salicylate group escaped with less cardiac damage. This would be a most important finding if substantiated by other similar studies.

Earlier reports of improvement,[7] occasionally dramatic, in acute rheumatic fever (excluding chorea) following treatment with cortisone and corticotrophin led to the organization in 1951 of a co-operative study of their value compared with aspirin by the American Heart Association and the Medical Research Councils of Great Britain and Ireland. Cases fulfilling agreed diagnostic criteria were allotted at random to one of three groups and treated with cortisone, corticotrophin, or salicylates in low dosage for six weeks, with a three-weeks observation period before retreatment, if necessary. The complete results of this study are not yet available, but in a recent paper Houser, Clark, and Stolzer[8] have analysed results of treatment of 148 young airmen included in it. No marked differences between the three treatment groups emerged at nine weeks from the start of treatment (three weeks after stopping it). Relief of joint symptoms appeared to be more rapid in the salicylate-treated group, while recurrences were as frequent as in the hormone-treated cases. All three drugs had a comparable effect on temperature and sleeping pulse rate. Short-term follow-up observations showed no difference between the three treatment groups in the incidence of murmurs which appeared during treatment; long-term results are not yet available.

Professor Illingworth has shown that salicylates in high doses are beneficial, but whether such dosage is more effective than dosage at less toxic levels has yet to be decided. Toxic manifestations are so real a hazard that his recommendation that such dosage should be given only where facilities for close supervision are available should be heeded. For patients gravely ill, cortisone or corticotrophin in high dosage has been recommended,[9] but the work of Houser *et al.*[8] does not indicate any clear superiority of these over salicylate therapy with more normal dosage levels. The relative advantages of these three forms of specific therapy and the best level of dosage will remain the subject of further investigation, particularly into the long-term effect on carditis. The only general agreement reached is that patients should be kept at bed rest throughout the period of acute illness, should be given penicillin or other antibiotic treatment for eradication of haemolytic streptococcal infection, and thereafter chemoprophylaxis for a period of two years or more.

[1] *Bull. Johns Hopk. Hosp.*, 1943, **73**, 435.
[2] *Arch. intern. Med.*, 1946, **78**, 170.
[3] *Ann. rheum. Dis.*, 1949, **8**, 120.
[4] *Bull. Johns Hopk. Hosp.*, 1945, **77**, 1.
[5] *Quart. J. Med.*, 1954, **23**, 177.
[6] Jones, T. D., *J. Amer. med. Ass.*, 1944, **126**, 481.
[7] Barnes, A. R., *et al.*, *Amer. J. Dis. Child.*, 1951, **82**, 397.
[8] *Amer. J. Med.*, 1954, **16**, 168.
[9] Waine, H., *Arch. intern. Med.*, 1954, **93**, 121.

DO PREMATURE BABIES CATCH UP?

It is probable that the two main reasons why healthy babies are born weighing less than 5½ lb. (2.5 kg.) are heredity, which may account for small size even of babies developmentally mature, and birth while the baby is still developmentally immature. When genetic factors are mainly responsible for the small size of a premature baby we might expect that the baby would remain small in childhood; when immaturity is mainly responsible, we might expect the baby to catch up with other children. Douglas and Mogford[1] have recently compared the

[1] *Arch. Dis. Childh.*, 1953, **28**, 436.

heights and weights of over 350 surviving premature babies with those of controls carefully matched for date of birth, social class, mother's age, place in family, and home address. In analysing their findings they have obviously had this kind of dual hypothesis in mind.

In the group as a whole the premature babies were lighter and shorter than their controls at 2 years and also at 4 years of age, when the prematures had on the average the weight of mature children of 3 years 6 months and the height of mature children of 3 years 8 months. But the proportion of prematures who had caught up or surpassed their controls at 4 years was close to 40%. These investigators also found, however, that the mothers of premature babies were shorter and lighter than the mothers of the controls. This difference was as marked for the middle-class as for the working-class pairs and so could not reasonably be attributed to poor nutrition handicapping the growth of mother and baby in the premature group. On the average the small size was among the mothers of the prematures who did not catch up—that is, the prematures who are, by hypothesis, small for genetic reasons. The average deficit in these women was over 12 lb. (5.5 kg.) in weight and nearly 2 in. (5 cm.) in height. The mothers of the prematures who caught up or surpassed their controls —the prematures who by hypothesis were immature— were on the average as big as the mothers of the controls. It is also understandable that Douglas and Mogford found that the very small babies (less than 4 lb. (1.8 kg.) at birth and also probably to some extent immature) should gain more than the remainder. But two other corollaries of the dual hypothesis were not borne out. We should have expected babies born more than four weeks before the expected date, and babies born to mothers with some complication of pregnancy predisposing to premature birth, to fall mostly in the immature group. In fact, these babies showed no greater tendency to catch up than the remainder. Perhaps recorded gestation period bears little relation to physiological maturity, and recorded obstetric history little relation to the sum of maternal states responsible for the birth of immature children, or perhaps the hypothesis is inadequate.

In Douglas and Mogford's words, "It appears that the height of a mother gives a better indication of the likely growth pattern of her premature baby than does her baby's weight at birth, the medical history of pregnancy, or the length of gestation, whether these factors are considered separately or in combination." If father's height had been available too the correspondence between babies' gain and parents' physique might have been better still.

INTESTINAL ANTISEPSIS IN SURGERY

Fifteen years ago primary intraperitoneal anastomosis after colon resection was all too often followed by serious infection which was always a threat to life. Surgical journals abounded with descriptions of aseptic techniques designed to lessen the risk of peritonitis. To-day, in striking contrast, simple, unhurried suture by the open method is the rule, always provided that there has been time for a careful pre-operative bowel preparation. For it is on the rapid improvement in intestinal antisepsis that the comparative safety of open colon anastomosis largely depends.

The first effective control of the intestinal flora followed the introduction of the slowly absorbed drugs of the sulphonamide series. Of these phthalylsulphathiazole was the most widely used, being relatively non-toxic and more effective gramme for gramme than the other members of the series. It had the advantage of being cheap and readily available, and caused little trouble other than making the intestinal content somewhat tenacious and difficult to clear mechanically. But, like the other sulphonamides, it failed to sterilize the gut completely, though it effectively inhibited multiplication of the Gram-negative flora.

Further attempts at intestinal antisepsis followed the introduction of the antibiotics. Penicillin was too rapidly inactivated to be of value. Streptomycin seemed at first to have more to offer, but the rapid development of resistant strains soon led to its abandonment. Although in 1950 trials with aureomycin were favourably reported from the Mayo Clinic,[1] the results as observed by others were by no means so consistent.[2] Terramycin was found to have the same limitations as aureomycin. Both were followed in a high proportion of cases by nausea, vomiting, and diarrhoea and by distressing changes in the mucous membranes. There have also been disturbing reports of severe cholera-like entero-colitis coming on in the early days of treatment on proper dosage and often ending fatally.[3,4] The condition seems to be caused by the unrestrained proliferation of antibiotic-resistant staphylococci. The hazard of this and of other super-infection during antibiotic treatment has already been noted in these columns.[5]

Soon after the discovery in 1949 of yet another antibiotic, neomycin, Poth and his colleagues[6] reported with some enthusiasm on its use as an intestinal antiseptic. It seemed to them to have all the essential requirements, including a broad bacterial spectrum, limited absorption, rapidity of action, and (when given orally) a low toxicity. In comparative trials it has since been found to be more effective than terramycin.[7] In doses of 2 g. every four hours for forty-eight hours it inhibits the growth of all bacterial flora. However, Poth was disturbed by the persistence in 10% of cases of resistant strains of *Aerobacter aerogenes*,[8] but these can readily be checked by the addition of phthalylsulphathiazole or bacitracin.[9] Neomycin seems, then, for the moment to be the ideal intestinal antiseptic and it will no doubt be given a wide trial in Britain as soon as supplies become freely available.

Unfortunately, the effectiveness of all these antibiotics is considerably diminished in the presence of obstruction or of fistula, both of which are commonly encountered in colon surgery. Further, the assurance which their help enjoins must never induce the surgeon to overlook

[1] Dearing, W. H., and Heilman, F. R., *Proc. Mayo Clin.*, 1950, **25**, 87.
[2] Pulaski, E. J., *et al.*, *Ann. Surg.*, 1950, **132**, 225.
[3] Reiner, L., *et al.*, *Arch. Path.* (*Chicago*), 1952, **54**, 39.
[4] Gardner, D. L., *Lancet*, 1953, **2**, 1236.
[5] *British Medical Journal*, 1953, **1**, 1382.
[6] *Tex. Rep. Biol. and Med.*, 1950, **8**, 353.
[7] Anlyan, W. G., *et al.*, *Arch. Surg.* (*Chicago*), 1954, **68**, 28.
[8] *J. Amer. med. Ass.*, 1953, **153**, 1516.
[9] Fog, C. V. M., *Acta chir. scand.*, 1953, **106**, 325.

the essentials of bowel suture—namely, the accurate approximation, without tension, of bowel which is empty and unobstructed and has an adequate blood supply.

POISONED NAPPIES

A baby may be killed by an unsuspected poison on his napkin. The case has been reported of a baby with an oiled skin being poisoned by naphthalene after his napkins had been stored with moth-balls,[1] and another very similar case has occurred.[2] Marking ink on a napkin has caused fatal methaemoglobinaemia, though this has occurred only when the ink was freely used and the napkin was not laundered before use.[3] The accidental contamination of a napkin left in a room sprayed with an organic phosphate insecticide has caused severe illness,[4] and a similar result might well follow the use of D.D.T. in kerosene, since poisoning has been noted in children subsequently inhabiting rooms so sprayed.[5] Mercurial rinses for napkins must be viewed with suspicion. But there is no doubt that much the most dangerous poison is one which is deliberately applied—namely, boric powder.

The dangers of boric acid as a poison when applied to wounds or taken by mouth have been known for many years, but recently a number of papers have particularly stressed the danger of applying boric powder to babies with napkin rash. In America, Goldbloom and Goldbloom[6] have reported four such cases of poisoning, and Ducey and Williams[7] have reported three others. In Britain, MacGillivray and Fraser[8] have reported yet another case.

The patient with boric acid poisoning often presents with symptoms of diarrhoea and vomiting. Thus symptoms calling for the use of boric acid—namely, loose stools causing sore buttocks—may be identical with the symptoms of boric poisoning, so that the early recognition of poisoning may be difficult. For this reason, cases of boric poisoning often reach hospital with a diagnosis of gastro-enteritis. The severity of the excoriation of the buttocks and scrotum should give a hint of the true diagnosis even at this stage. A general erythema may appear, and sometimes an exfoliative dermatitis, leading to a diagnosis of "Ritter's disease." However, children with boric poisoning usually show a redness of the digits, nose, and ears so marked as to suggest the correct diagnosis. Later complications are the appearance of fits, opisthotonos, and pulmonary complications, so that meningitis and pneumonia also enter into the differential diagnosis.

However, if boric poisoning is kept in mind it is not likely to be missed, although numerous cases must have been missed in the past. In the cases on record a boric-containing powder has always been applied directly to unhealthy areas of skin, and no case has followed the use of boric by the common method of rinsing a napkin in boric solution and then shaking it out. MacGillivray and Fraser pertinently point out, however, that it would be impossible to convince the public that boric acid may be poisonous when used as a powder if it continued in use as a rinse. For this reason boric acid is better not used in infant hygiene. Its antibacterial action as a dusting powder is slight, and, as a napkin rinse, the quaternary ammonium compounds are both safer and more effective.

[1] Schafer, W. B., *Pediatrics*, 1951, **7**, 172.
[2] Johnston, N. A. F., *British Medical Journal*, 1952, **2**, 565.
[3] Scott, E. P., *et al.*, *J. Pediat.*, 1946, **28**, 713.
[4] Chamberlin, H. R., and Cooke, R. E., *Amer. J. Dis. Child.*, 1953, **85**, 164.
[5] Karpinski, P. E., *J. Pediat.*, 1950, **37**, 373.
[6] Goldbloom, R. B., and Goldbloom, A., ibid., 1953, **43**, 631.
[7] Ducey, J., and Williams, D. B., ibid., 1953, **43**, 644.
[8] MacGillivray, P. C., and Fraser, M. S., *Arch. Dis. Childh.*, 1953, **28**, 484.

A VERY-SHORT-ACTING ANAESTHETIC

In 1932 the German pharmacologist H. Weese introduced "evipan," which is known by the official name hexobarbitone. This represented a major advance in anaesthesia, since evipan, because of the short duration of its action, was free from the dangers of pentobarbitone when used as a general anaesthetic. Evipan was the forerunner of thiopentone, which is now so widely used in this country. Professor Weese died recently, and there has now appeared a posthumous paper,[1] written jointly with F. H. Koss, describing a still-shorter-acting substance than hexobarbitone. This substance is sodium 5,5-allyl-(2'-methyl-propyl)-thiobarbiturate, and is known as "baytinal." It is recommended especially for operations which do not last more than ten minutes, so that the patient need not stay in hospital, and is once more "strassenfähig" (capable of walking in the street) after half an hour. In such cases no other drugs are given. There is retrograde amnesia for about ten minutes after waking up, and a condition of euphoria for one to two hours, so that the patient should not drive a car on the same day. Patients are said not to be sleepy or drowsy after recovering from the anaesthetic, which has been used without accident in 350 cases in the surgical clinic in Düsseldorf. Before bronchoscopy or appendicectomy is performed on in-patients the usual premedication is given, though morphine and its derivatives are avoided because of the respiratory depression they cause. Baytinal alone does not sufficiently relax the muscles of the body wall for abdominal operations, and succinylcholine is recommended for use with it. Weese and Koss found that patients do not have to be watched after operations, since vomiting and other complications did not occur. The anaesthetic is given to adults by intravenous injection of 2 to 3 ml. of a 10% solution, which is injected quickly. After one to one and a half minutes a further 1 to 3 ml. is given slowly. If the duration of operation requires it a further 3 to 4 ml. can be injected, but a total dose of more than 1 g. (10 ml.) has not been used.

The paper by Weese and Koss gives the principal results of an investigation on rabbits, cats, dogs, and monkeys. Baytinal closely resembles hexobarbitone in its behaviour, but it is more rapidly destroyed, its destruction taking place chiefly in the liver. The contribution of Weese to anaesthesia by the introduction of evipan was very great, for it finally removed from operations the unpleasantness of the period of induction of anaesthesia. His last achievement in discovering the properties of baytinal adds more to the credit due to him.

[1] *Dtsch. med. Wschr.*, 1954, **79**, 601.

British Medical Association

ANNUAL MEETING, GLASGOW, 1954

SUMMARY OF PROCEEDINGS

THE SECTIONS

SECTION OF ANAESTHETICS

Friday, July 9

Medico-legal Hazards in Anaesthesia

With the president, Dr. JOHN GILLIES (Edinburgh), in the chair, Professor W. W. MUSHIN (Cardiff) opened a discussion on those circumstances which may lead a practitioner into the courts to face a charge of negligence. He said that anaesthetists figured in a disproportionate number of cases. Among the factors predisposing to prosecution he listed: first, doing something generally known to be clinically bad, such as sterilizing spinal ampoules and rubber face-masks in antiseptics; secondly, leaving undone something generally considered to be necessary, such as not inserting a throat-pack for dental and mouth operations or forgetting to check the cylinders. Thirdly, he mentioned events about which there might be some differences of opinion, such as abduction of a patient's arm during operation or the choice of an unsuitable anaesthetic or method. Fourthly, there were accidents which might be held to be preventable, like the turning on of taps without the anaesthetist being aware of it. Fifthly, something could go wrong which, so far as was known, was not preventable. Professor Mushin illustrated many of these and other points by recent cases from the courts and emphasized that the anaesthetist must take care, must have a wide knowledge of his subject and skill in its practice, and must keep abreast of the times.

While stressing the importance of co-operation, he pointed out that it was solely the responsibility of the anaesthetist to choose the anaesthetic and method, and, whereas any junior practitioner might reasonably be expected to give a simple anaesthetic, it was desirable for a consultant in the specialty to assess a junior's ability to do more difficult cases. It was quite wrong for a hospital authority to appoint or direct a junior anaesthetist, even of registrar status, to do routine operating lists without the knowledge, supervision, or advice of a consultant. Professor Mushin concluded by mentioning the dangers of research, especially when it involved the use of incompletely understood methods of drugs.

Mr. WILLIAM MAIR (Glasgow), a solicitor with a wide experience of medico-legal cases, attributed the recent increase in litigation to three main causes: (1) The National Health Service, which was believed to have converted the cure of the sick from a work of mercy freely offered and freely accepted to a right purchased by a weekly stamp; (2) the institution of the legal aid scheme; and (3) the wide publicity given to cases, which had produced an attitude of "have a go." He gave two legal definitions of negligence, showing that it could be an act of commission or an act of omission. A doctor ought to bring to his treatment of a patient the reasonable skill and care professed by the normal and prudent practitioner of the same experience and standing. A specialist obviously professed a higher degree of skill than one who claimed no special training. No one could ensure or guarantee a favourable outcome, but, with the exercise of knowledge, skill, care, and diligence, there could be no negligence. He mentioned, however, the intrusion into this branch of the law of the rule *res ipsa loquitur*, which transfers the onus of proof from the plaintiff to the defendant.

In England, but not in Scotland, there was now a tendency to transfer liability from the doctor to the employing authority; this could be dangerous to the freedom of the profession. Mr. Mair concluded by criticizing those medical and dental practitioners who ran the risk of acting as operator and anaesthetist at the same time.

Replying to Dr. F. G. WOOD-SMITH (London), Mr. MAIR said that every doctor should consent to give evidence when asked to do so and should do it honestly to assist the ends of justice. To Dr. W. AUKIN (Leeds), who asked where the responsibility for complications lay when the surgeon directed the position of the patient, he replied that no decision had been made. Professor MUSHIN maintained that the anaesthetist should see to the general welfare of the patient and that he could point out any dangers. He told Dr. T. D. CULBERT (Manchester) that he had seen one case of dermatitis caused by "dettol" on a face-mask.

Mr. JAMES RUSSELL (Glasgow), Drs. H. E. POOLER (Chesterfield), W. B. PRIMROSE (Glasgow), and J. D. ROBERTSON (Edinburgh) also took part in the discussion, at the end of which Dr. GILLIES handed over the chair to Dr. F. G. WOOD-SMITH.

Hand Blood-flow

An occasional paper on hand blood-flow during sleep was given by Mr. A. PRINGLE and Dr. I. D. FERGUSON (Glasgow), followed by Dr. A. C. FORRESTER (Glasgow) on hand blood-flow during anaesthesia. It was suggested that the onset of shock could be foretold at an early stage by changes in this flow.

Dr. R. P. HARBORD (Leeds) described the changes which can occur in man's alveolar CO_2 under thiopentone and muscle relaxants with varying conditions of ventilation. Alveolar gases, obtained by sudden pressure on the sternum at the end of expiration, were collected. They showed the extreme rapidity with which CO_2 accumulated when respiratory movements were inadequate. Conversely, no harm could be shown to follow hyperventilation. His experiments suggested that CO_2 production was low in patients in a state of "hibernation."

Neonatal Anaesthesia

In relating some second thoughts on this subject, Dr. G. JACKSON REES (Liverpool) said that respiration of the newborn undergoing operation should be "controlled" and that this could be achieved without relaxants. Whereas the use of D-tubocurarine was dangerous, suxamethonium could be used with safety. He advocated intubation as a first step in induction, and had discarded any attempts to maintain the child's temperature during operation—nor was active warming at the end necessary. The infants were nursed in special incubators in a slight head-up position to avoid upper lobar collapse, in an atmosphere of high humidity. Only 25 deaths had occurred in 98 severe cases, 33% of whom were premature.

Artificial Respiration and the Circulation

Dr. GILLIES having returned to the chair, Dr. TRIER MØRCH (Chicago) showed a film which clearly demonstrated that if a high mean positive pressure was maintained during artificial respiration, not only did the peripheral circulation slow and then stop, but it even went backwards. Although reasonable pressure levels could be maintained with difficulty by means of quick inflations followed by long pauses, in order to keep the mean pressure easily and effectively at a low level it was necessary to have a negative pressure phase as well as a positive. The film showed the apparatus which he had devised for this purpose. He reiterated that no harm came from hyperventilation under working conditions, and he mentioned some of its advantages.

SECTION OF CARDIOLOGY

Friday, July 9

Coronary Artery Disease

With Dr. J. H. WRIGHT (Glasgow) in the chair, Professor J. B. DUGUID (Newcastle-upon-Tyne) opened a discussion on coronary disease. He said that clinical coronary artery disease implied narrowing or occlusion of arteries, which atherosclerosis did not necessarily produce. Two pathological specimens illustrated contrasting processes. One

showed a coronary thrombosis which had caused sudden death in a man aged 31, yet the remaining coronary tree was healthy. The other specimen, from a diabetic woman who had no angina and died in diabetic coma, showed gross atheroma of all the coronary tree without narrowing.

Professor Duguid reviewed Rokitansky's concept that thrombosis was the fundamental cause of narrowing, and the essential problem was what caused thrombosis, not what caused atheroma. Experimentally he had injected chopped-up clots intravenously, producing emboli which were studied at their site of lodgment. Emboli a week old showed a cellular covering growing from the edge, and the whole clot was, after some three months, incorporated in the vessel wall like an atheromatous patch. Slides of human specimens were shown illustrating first the ragged clot, then the endothelial covering, and finally transformation of the clot by fatty degeneration of fibrin and fibrous tissue. Successive layers of clot undergoing such changes finally obliterated the lumen. Small clots did not appreciably narrow the lumen, but the problem was how to limit the size of the clots. The aetiology of thrombosis itself was the ultimate problem in these cases.

Significance of Cholesterol

Dr. T. D. V. LAWRIE (Glasgow) discussed the significance of cholesterol in the causation of atheroma and coronary artery disease. Cholesterol was a constituent of the atheromatous patch. It was tempting to think that disturbance of cholesterol metabolism might be an important factor in the causation of atherosclerosis and that this disturbance might be combated, for example, by dietetic measures. Cholesterol, which belonged to the sterol group, was found within every cell in the body. It was kept in solution in the blood by phospholipids. Its origin was both exogenous and endogenous. Although the chemical formula was known, many fundamental facts regarding its metabolism and function were as yet unknown. Diseases characterized by a high cholesterol concentration, like diabetes, nephrosis, and xanthomatosis, did have a tendency to coronary atherosclerosis, but hypercholesterolaemia was not constant in ordinary cases of atherosclerosis.

Experimental investigation mainly in the chick and rabbit had contributed considerably to the knowledge of the causation of atherosclerosis, but there was as yet no general agreement on how far experimental atherosclerosis simulated human atherosclerosis. More recently biochemical investigation by electrophoretic techniques and ultracentrifugation methods had shown that when atherosclerosis was associated with a normal or only slightly raised serum cholesterol the cholesterol: phospholipid ratio in the various lipoprotein fractions might show a specific derangement. Account had still to be taken of local factors in the vessel wall before a solution of the problem of atherosclerosis was found.

Electrocardiography in Coronary Artery Disease

Dr. W. EVANS (London) said that a normal electrocardiographic tracing excluded cardiac pain arising from coronary arterial disease, provided three conditions were satisfied. First, the cardiogram must be a reliable one; secondly, the tracing must be strictly normal; and, thirdly, the distinctive mutable cardiogram of coronary arteriospasm had to be excluded. The most reliable cardiogram so far devised was made up of the bipolar leads I, II, III, IIIR, CR_1, CR_4, and CR_7. The so-called unipolar limb leads gave no additional information to the bipolar leads, and even the VF lead gave false readings unless repeated during deep breathing. Again, the bipolar CR leads were far superior to the chest V leads, especially in the diagnosis of cardiac pain, in which a deformity of the T wave mattered so much. Thus over the right ventricle the T wave in the V leads was commonly inverted, while over the left ventricle the T wave in V_7 was always low, often flat, and sometimes inverted—and that in health. The T wave in CR_7 was always obviously upright in health.

In discussing the second condition that must be satisfied, Dr. Evans emphasized that there was a need to recognize the lesser electrocardiogram changes of cardiac pain, which included depression of any part of the S–T segment, a low T wave, a blunt T wave, terminal dipping of the T wave, the appearance of a Q wave in IIIR provided the diaphragm had moved downwards on inspiration, an inverted U wave, and notching of the RS stem in CR_7. The third condition meant the recognition of the unusual though distinctive mutable E.C.G. of coronary arteriospasm in which cardiac infarction was seldom a sequence. Here the tracing showed inversion of the T wave in I and in CR_1 to CR_4 or beyond without significant Q waves or depression of the ST segment. Such a cardiogram reverted in time to a strictly normal tracing.

When these three conditions were satisfied the E.C.G. was probably never normal when cardiac pain was due to coronary arterial disease, and the recognition of this would inevitably prevent the unwarranted invalidism now so prevalent among patients in whom chest pain had been in the meantime wrongly attributed to coronary artery disease.

The Use of Oestrogens

Dr. M. F. OLIVER (Edinburgh) discussed the use of oestrogens in the treatment of coronary artery disease. There was no longer any doubt that overt coronary sclerosis was associated with derangement of the plasma lipid patterns. The rarity of clinical coronary sclerosis in women before the menopause postulated that their menstrual physiology had a protective influence, and suggested—in the light of his finding that oestrogen might be related to depression of the plasma lipids at ovulation—that oestrogens might restrict the progress of coronary sclerosis.

The theoretical benefit to the arterial intima from control of the plasma lipids by oestrogens had subsequently received histological support from the finding of comparatively sparse atherosclerotic lesions in men treated by oestrogens for carcinoma of the prostate. In men with coronary sclerosis the plasma ester and total cholesterol, the total cholesterol-phospholipid ratio, and the concentration of cholesterol on the β-lipoprotein fraction, were strikingly depressed by ethinyl oestradiol. The toxic effects were troublesome and were not removed by combination with an androgen preparation, nor probably by combination with progesterone. Widespread trial of oestrogens, therefore, might be precluded by their toxic effects, and was at present not justified outside the orbit of clinical research. The mechanism whereby oestrogens depressed the plasma lipids was not understood, but there was some evidence to implicate the pituitary–thyroid axis. Hormones of the pituitary–adrenal axis influenced the plasma lipids. Gonadal, thyroid, and adrenal cortical activity decreased as the incidence of coronary sclerosis increased. Many subjects of coronary sclerosis were particularly disposed to stress.

All these observations suggested that the endocrine aspect of coronary sclerosis might be a fundamental and profitable line of investigation. It was conceivable that the disturbances of lipid metabolism, the thrombotic tendency, and the lesion itself were all results of a basic upset in endocrine balance.

Shock in Myocardial Infarction

Dr. K. SHIRLEY SMITH (London) discussed the treatment of shock in myocardial infarction. Cardiogenic shock developed a greater or less degree in about half of all patients with cardiac infarction who survived the acute onset. Pallor and sweating, low blood pressure, small and usually quick pulse, and variable blunting of consciousness were characteristic. When severe or prolonged shock existed the pulse disappeared and the patient became unconscious. Four out of five patients with grave shock died. Intravenous infusions of hypertonic glucose, plasma, blood, and dextran had been

used with little success. Adrenaline and ephedrine had been shown to produce fatal ventricular fibrillation. On the other hand, the laevorotatory isomer of adrenaline, known as L-noradrenaline, was the most powerful overall vasoconstrictor known, but, unlike adrenaline, it did not increase the rate or work of the heart. This substance had been found to exert a swift and immediately beneficial effect upon cardiogenic shock. The intravenous infusion began to raise the blood pressure within a few minutes of starting, and thereafter the pulse became palpable and the blood pressure measurable, while consciousness dramatically returned—the whole aspect of the patient becoming transformed within 30 to 60 minutes.

A blood pressure not rising above 80 mm. Hg after one to two hours of the usual treatment was an indication for L-noradrenaline. Dr. Shirley Smith quoted statistics from four published reports. Of the total of 58 patients treated, 43 showed a clear-cut pressor response to L-noradrenaline, while 26 ultimately survived. The lives of all of the seven patients whom Dr. Shirley Smith had treated by this method were judged to be immediately threatened, and three were pulseless when treatment was begun. Nevertheless, four survived for periods ranging from three to twenty months. Anticoagulants were used in all cases. Necropsy studies of the hearts of three patients who died in spite of this treatment showed multiple old and new cardiac infarctions. In them the relief of shock was unavailing, since the total extent of myocardial damage was so great that maintenance of the circulation became impossible. Treatment with L-noradrenaline was not ordinarily practicable in the home.

Sex Differences

Dr. A. A. F. PEEL (Glasgow) showed that there were striking differences in the behaviour of coronary artery disease in the two sexes and at different ages. In males the incidence remained low up to the age of 40, then rose rapidly to a maximum at 55, thereafter falling almost as steeply to the age of 80. In females the incidence rose gradually and steadily from 40 to 80; and the incidence of actual infarction, contrasted with simple ischaemia, did not increase with age as it did in males over 50, suggesting that males of that age did not so readily produce a collateral circulation, and the mortality was correspondingly higher. Dr. Peel emphasized the danger of severe shock; he had found that intravenous glucose-saline might give a notable relief from pain.

Discussion

Inviting discussion, the CHAIRMAN said there was no ground for complacency in dealing with coronary disease. Among the questions awaiting answer were the nature of the local disturbances leading to thrombus formation, the feasibility of dietetic control, and the influence, if any, of heparin on atheroma itself.

Dr. W. N. LEAK (Cheshire) questioned the value of warmth and intravenous saline in shock. Dr. J. A. TULLOCH (Edinburgh) asked if there was left ventricular failure or anuria in Dr. Shirley Smith's cases. Dr. A. FULLERTON (Yorks) advocated flying squads for the treatment of shock. Dr. W. N. ROLLASON (Hull) asked if arterial transfusion was useful. Dr. J. K. MADDOX (Sydney) had not found minor electrocardiographic changes as often as Dr. Evans, and he feared that minor abnormalities might be missed.

Replying, Professor DUGUID said clots might precede symptoms for years. Dr. LAWRIE said that the value of dietetics was still unknown, and it was doubtful whether heparin had any effect on atheroma. Dr. EVANS emphasized that the interpretation of electrocardiograms was best left to experienced and competent physicians. Dr. SHIRLEY SMITH had not met waterlogging of the lungs during treatment with L-noradrenaline nor cases of anuria. He thought that modern transport was not usually detrimental to shocked patients who required hospital treatment.

SECTION OF DERMATOLOGY

Friday, July 9

Prevention of Dermatitis and Allied Disorders

With the president, Dr. BRIAN F. RUSSELL (London), in the chair, Dr. F. F. HELLIER (Leeds) opened a discussion on the prevention of dermatitis. He emphasized that persons with dry skins or a history of eczema should not work in contact with irritants. He discussed preliminary patch-testing and the investigation of the alkali resistance of the skin. There was an engineering aspect to the avoidance of contact with irritants and a few simple rules were valuable. Care should be taken in cleansing the skin, and protective clothing used where suitable. Barrier creams were to prevent, not cure, dermatitis. He considered that a workman should be removed to alternative employment directly he showed evidence of dermatitis. Employees should be educated in the potential risks of their work.

Dr. GEOFFREY A. HODGSON (Cardiff) spoke on the protective aspects of skin disease in the home. The majority of cases of industrial dermatitis were due to primary irritants and not sensitization. Similar risks were present in the home and protective measures should be observed. He discussed the natural protective barrier of the skin and its penetration. Resistance was low in certain types of skin and in states of fatigue. Excessive feeding and over-anxiety might cause trouble, and he dealt with some of the hazards of childhood such as wool sensitiveness, napkin rash, and parasitic infestation. "Green" mothers and the aged were more susceptible to injury from alkalis and detergents. Washing machines, barrier creams, fabric and rubber gloves were of some value in protection.

Dr. C. N. D. CRUICKSHANK (Birmingham) felt that barrier creams were of limited value and should not excuse the taking of proper precautions in other directions. They were apt to give a false sense of security. Using the test of fluorescence under ultra-violet light to demonstrate residual oil in follicles of the skin, he had found that the fatty barrier creams intended for protection against water and aqueous irritants favoured better cleansing of the skin than the vanishing-cream type or the non-greasy barrier creams intended for use against oils and solvents. Care in application was important, as shown by the institution of beauty parlours for the use of creams in munitions factories during the war. Barrier creams protected the pitch worker against "smarts."

Dr. E. COLLIER (Glasgow) spoke as an industrial medical officer and emphasized the responsibility of both employer and employee in preventing industrial dermatitis, which was the major cause of industrial disability.

There was a lively discussion on these opening papers. Dr. J. E. M. WIGLEY (London) had found "plastic mitts" preferable to rubber gloves for industrial workers and housewives. He and several other speakers disagreed with Dr. Hodgson on the role of wool in the provocation of infantile eczema. Dr. I. B. SNEDDON (Sheffield) stressed the importance of trauma in precipitating an industrial dermatitis; it had done so in 12% of a series of 300 cases he had investigated. The use of unsuitable antiseptics in ambulance rooms was an added hazard. The PRESIDENT reminded the meeting of the wisdom of surgeons in moving from antiseptics to asepsis. Adhesive dressings might be the trauma responsible for starting trouble. He reviewed a series of cases of dermatitis and found that 21% were occupational and 31% due to unsuitable applications. Dr. H. R. VICKERS (Sheffield) and Dr. J. FERGUSON SMITH (Glasgow) noted that a constitutional predisposition was necessary; only a few men, subjected to the same working conditions and hazards, would break down with dermatitis. Dr. J. T. INGRAM (Leeds) felt that most of what had been said emphasized the importance of common sense, which, however, was all too uncommon. In a printing works a dangerous process emitting chrome fumes was done by a particular worker at a fume cupboard in a special room. But the vent from this fume cupboard opened into the main workshop. Dr. J. SOMMERVILLE (Glasgow), who welcomed the members of the Section

to his department where the meeting was being held, said that he disapproved of housewives wearing rubber gloves at all. Dr. H. J. WALLACE (London), with good reason, reminded the meeting that many subjects of atopic eczema were among the most gifted members of society. Dr. A. G. FERGUSSON (Glasgow) said that improved working conditions, such as the provision of baths, often introduced new hazards. He thought that sweating played an important part. The "coalman" in town did not suffer from dermatitis as did the collier at the coal face. Dr. W. N. GOLDSMITH (London) thought that the reason for intolerance of woollen garments was mechanical tickling. Dr. HELLIER, in replying, said that irritating fibrils from wool could be removed by enzyme treatment, producing a soft and silkier material.

Otitis Externa

Dr. J. FERGUSON SMITH (Glasgow), a vice-president of the Section, then took the chair and Mr. CHARLES A. KEOGH (London) read a paper on otitis externa. He drew attention to the anatomy of the parts affected, the S-shape of the canal, and the importance of the cerumen and hairs in the outer canal as protective mechanisms. If this barrier broke down for any reason, and particularly as the result of trauma, then dryness and scaling and infection of the whole canal followed, often with serous exudate and infiltration. Treatment was difficult. Careful cleansing with olive oil, by means of cotton-wool on the end of a stick, was a necessary preliminary. Appropriate antibiotics were sometimes used, moisture was to be avoided. Mr. Keogh's paper was illustrated by a series of excellent lantern slides prepared by the Departments of Pathology and Anatomy of the London Hospital. Dr. BRIAN F. RUSSELL (London), president of the Section, followed with an analysis of 57 cases. In 24 the ears only were affected, in the remainder there were other affections such as neurodermatitis. Staphylococci and intestinal organisms were predominant. Treatment of the nasal vestibule and washing of the hands were important. Dr. F. F. HELLIER (Leeds) mentioned that it was unusual for otitis media to cause otitis externa. He cited a case of allergic sensitiveness to the plastic ear-pieces of a stethoscope. Dr. H. J. WALLACE (London) asked if fungous infection following the use of antibiotics was often seen. Dr. J. SOMMERVILLE (Glasgow) agreed that it was important to avoid water, but he did not like patients putting a probe into the ear. Dr. A. G. FERGUSSON (Glasgow) recognized three types of otitis externa—a coccal and a fungous infection and a neurodermatitis. He found the dyes in a zinc paste a useful application in the latter. Dr. W. H. BROWN (Glasgow) found small doses of *x* rays valuable in treating the neurodermatitis. In replying, Mr. KEOGH demonstrated how the meatus should be cleansed.

Treatment of Haemangiomata

With Dr. H. J. WALLACE (London), a vice-president of the Section, in the chair Dr. W. A. LISTER (Plymouth) read a paper on the treatment of haemangiomata, illustrated by lantern slides. The cavernous type, the strawberry mark, cleared spontaneously before the fifth year in all but a very few patients. Increased growth in the first year was followed by gradual resolution. He quoted Walter's figures to show that it was doubtful if radiotherapy materially altered the course of these cases. Port-wine stains persisted. Dr. I. B. SNEDDON (Sheffield) had seen the angiomata arise in the adult and persist, sometimes as a familial disorder. Dr. J. E. M. WIGLEY (London) thought it important that school medical officers should know these facts. Dr. J. T. INGRAM (Leeds) thought port-wine stains were due to ectasia of normal vessels, whereas cavernous angiomata were an abnormal growth of vascular sinuses. He thought that lymphangiomata did not disappear, but there were other congenital skin lesions that disappeared spontaneously. Dr. F. F. HELLIER (Leeds) said it was suggested that there was a difference histologically, in relation to interstitial cells, between the angiomata that disappeared and those that persisted. Angiokeratomata persisted. Did the haemangiomata associated with hypertrophy of limbs persist? Dr. GEOFFREY A. HODGSON (Cardiff) asked if size and location affected prognosis. Dr. H. R. VICKERS (Sheffield) thought cavernous angiomata were not true naevi, and the PRESIDENT mentioned that icterus neonatorum and immaturity of the liver might have some bearing on aetiology. Dr. WALLACE had found *x*-ray therapy of no value and sometimes harmful to underlying growing structures. In replying Dr. LISTER said he thought the lesions arising in adults were different. *X* rays might cause tough scarring. There was no risk of serious haemorrhage from strawberry marks. He had seen sarcomatous changes in one case of port-wine stain in an adult.

A number of interesting dermatological cases were shown and discussed under the direction of Dr. J. SOMMERVILLE (Glasgow).

SECTION OF FORENSIC MEDICINE

Friday, July 9

Forensic Medicine and the Public

With the president, Professor JOHN GLAISTER (Glasgow), in the chair, Professor D. J. A. KERR (Edinburgh) opened a discussion on forensic medicine and the general public. The public, he said, did not fully appreciate the role of forensic medicine. Medico-legal work was associated in the mind of the man in the street in terms of sensational murders, but a large amount of medico-legal investigation was always going on which failed to hit the headlines; approximately one in ten of all deaths was reported for investigation for one reason or another. This represented a lot of routine work with little or no news value. Professor Kerr thought that alcohol had been exaggerated as a cause of road accidents; in Edinburgh only 5 per 1,000 accidents could be attributed to this cause. Far more people were unfit to drive because of some clinical condition, such as defective vision, than was realized. Persons requiring to wear glasses should have their licences endorsed to that effect so that in the event of an accident this fact might be known to the authorities. He also touched on the increased incidence of barbiturate poisoning and the prevalence of abortion in married women. In conclusion Professor Kerr made a plea for adequate training of undergraduates in forensic medicine. In the public interest, the amount of instruction given should not be allowed to fall below the minimum necessary for a general practitioner.

Mr. HECTOR MCKECHNIE, Q.C. (Edinburgh), followed with a contribution from the lawyer's point of view. He dealt with the question of malpractice. Several causes, he said, had led to the increase in actions against medical men and hospitals since the National Health Service Act (1947) became law. The main ones were the growing materialism of the relationship between doctor and patient, the new facilities for legal aid, and the readiness of medical experts to give evidence against their colleagues. Nowadays when a person met with a misfortune, he at once sought to make someone else liable and ceased to regard it as a visitation of God. The bond between the doctor and his patient had been loosened by the Health Service and by the formation of medical partnerships. Treatment was now a right, not a privilege, and a matter of special contract. If the doctor made a mistake, the patient thought the doctor could afford to pay for it. In Scotland, a hospital board was not liable for the faults of persons performing skilled professional services, but in England such a liability had been increasingly imposed since 1942 (Gold *v.* Essex County Council, and Cassidy *v.* Minister of Health, 1951). Mr. McKechnie expressed the hope that the Scots courts would not follow the English example in this regard. He warned the medical profession that embarking on unorthodox treatment without the patient's consent would be apt to lead to disaster if the treatment failed and the patient sued. He thought that perhaps courts ought to have the help of medical assessors in cases of negligence involving medical practitioners.

Dr. J. C. MCI. MATHESON (London) spoke on forensic psychiatry. In his view, a psychiatrist called by the defence was an expert witness with a duty to the court and not to

the accused alone. Some psychiatrists argued that the accused had become a patient and that they owed a duty as doctors primarily to help the patient. He did not agree with this. Arriving at the truth should be the aim no matter who had engaged the psychiatrist's help. Dr. Matheson stressed the importance of early psychiatric examination in criminal cases. The point at issue was the accused's mental condition at the time of the alleged offence, not before or after. If agreement on medical matters could be reached before the trial, this was a great advantage as it avoided the unedifying spectacle of two or more expert witnesses expressing totally different opinions on the same set of facts.

Forensic Pathology

Professor C. J. POLSON (Leeds), speaking on forensic pathology, declared that the public deserved an adequate service organized on a national basis. Coroners' cases should have the same standard of investigation as any other pathological problem; while from the public point of view the service might often be anything but spectacular, it was important in allaying suspicion and rumour, and in obtaining evidence for insurance, compensation, or pension claims. Coroners and procurators-fiscal were mainly laymen, and an experienced forensic pathologist could assist considerably in interpreting the medical aspects of a case. The importance of pathological evidence in capital charges was obvious, and the services of an independent skilled pathologist were necessary in all cases involving claims against medical practitioners or hospital authorities. Forensic pathology should not be practised by clinical pathologists as a side-line; the public should have a service staffed by practitioners engaged exclusively in forensic pathology.

Dr. J. A. IMRIE (Glasgow) said that the tendency to regard forensic medicine as a branch of pathology was unfortunate. Much of the subject involved clinical and laboratory examinations. While in some instances the pathologist held the key to the case, it had to be remembered that there were only 150 to 160 murders per annum in Britain, and that there were many more cases involving serious violence to the person or sexual assault. An examination at the scene of a crime, he said, was most valuable, and this might direct the investigation of a case along the correct channels in its early stages. Experienced medical examiners with a clinical training were required. The average practitioner had no desire to become involved in such matters.

The Drunken Driver

Dr. R. D. SUMMERS (London), in a paper read on his behalf by Dr. FRANCIS E. CAMPS (London), dealt with the question of the drunken driver. He deprecated the tendency in Scandinavia and certain American States to penalize a driver with a certain level of blood alcohol, irrespective of his clinical condition. That attitude took no account of individual variations in tolerance. The doctor's main duty in these cases was to exclude illness or injury as the complete or partial explanation for the accused's condition. Once these had been excluded the problem was not really medical at all. Dr. Summers asked for research into the effects of alcohol on the skills involved in driving a car, and the development of a small and easily produced reaction-time machine. He also made a plea for the adequate remuneration of medico-legal experts, the provision of proper accommodation, and of facilities for reliable chemical analysis. He appealed to the courts not to waste doctors' time, and to the universities to provide adequate undergraduate and postgraduate education.

Mr. MAGNUS HERD (City Analyst, Glasgow) commented on "The Recognition of Intoxication," a recent B.M.A. publication. He deplored the undue prominence given to micro-chemical methods in the determination of tissue alcohol levels. These should be used only when there was insufficient material for the Kozelka and Hine method. Mr. Herd claimed that serious error did not arise even though the analysis was postponed for three months. There was no need, therefore, for the analysis to take place necessarily within eight days. He said some courts would not accept analytical evidence when the specimen was taken by a police officer. He thought the doctor in the case should take the sample.

Sir SYDNEY SMITH (Edinburgh), Dr. W. L. SELKIRK (Liverpool), Dr. GILBERT FORBES (Sheffield), and Dr. F. E. CAMPS (London), took part in the discussion which followed the opening papers.

SECTION OF NEUROLOGY

Friday, July 9

Occupational Neurological Diseases

The two topics discussed this year were occupational and industrial hazards to the nervous system, and the treatment of brain abscess. The chair was occupied in rotation by Dr. MACDONALD CRITCHLEY, the president, and by Mr. J. ERIC PATERSON (Glasgow) and Mr. D. W. C. NORTHFIELD (London), vice-presidents of the Section.

Dr. H. G. GARLAND (Leeds) in a paper on compressive lesions of peripheral nerves reviewed 121 cases from his own practice. Meralgia paraesthetica, ulnar palsy, external popliteal palsy, and median palsy at the wrist were, in that order, the common forms—others, including musculo-spiral palsy, being rare in his experience. Trauma, either intermittent or continuous, was an aetiological factor, and the term neuritis, with its implication of inflammation, should be abandoned. Ulnar palsy arose at the elbow in 51 of his 55 cases, either from direct pressure or from repeated movements of the joint. External popliteal palsy, similar to ulnar palsy in being painless and motor more than sensory, was caused by prolonged kneeling or by wearing tight garments such as knee-pads or surgical dressings around the fibular head. Meralgia paraesthetica, caused by nipping of the external cutaneous nerve of the thigh as it passed through the fascia lata, and associated with much standing and walking, presented with numbness and painful paraesthesia, as did median nerve lesions in the carpal tunnel. This last was commoner in the female, a reversal of the sex incidence in all the other forms: and its intermittent nature and association with sleep suggested that neural oedema was a factor. Pain was very variable in these conditions and its cause was a problem.

In discussion Dr. A. FULLERTON (Batley) mentioned a case of meralgia brought on by lying with legs flat. The PRESIDENT suggested that ischaemic factors by arterial pressure might be important and pointed out that drop-foot could occur from popliteal artery compression. Dr. J. B. GAYLOR (Glasgow) doubted the importance of direct pressure, and cited the low incidence of ulnar palsy in slaters, whose occupation caused heavy pressure on both elbows. Mr. D. W. C. NORTHFIELD (London) asked if traction was not as important as compression in these cases. Dr. C. W. M. WHITTY (Oxford) suggested that the forearm pain in carpal tunnel lesions might be explained by an associated chronic tenosynovitis sometimes found at operation. In reply, Dr. GARLAND envisaged both compression and traction as causing trauma and probably ischaemia of nerves.

Gas Poisoning and Nervous System Lesions

Dr. R. S. ALLISON (Belfast) spoke on damage to the nervous system from gas-poisoning. Gas, coke, and foundry workers were liable to this hazard, as were coal-miners and all who might be exposed to exhaust fumes from petrol and oil engines. The results of this poisoning were due almost entirely to anoxia, and the severity and duration of exposure were important—though anaemia, hypoglycaemia, and arteriosclerosis played a part in determining severity. Necropsy studies showed that certain parts of the nervous system were more vulnerable—the cortex, hippocampus, and basal ganglia were heavily involved, and there was often some loss of cerebellar Purkinje cells. The histological picture, which he illustrated with slides, showed capillary dilatation with diapedesis and diminution in neurone count with patchy demyelination. If patients survived for long periods a neuroglial response was also seen. Three groups could be

recognized clinically: (1) Momentary anoxia giving transient clouding or loss of consciousness, possibly with convulsions, abnormal behaviour, and temporary neurological signs such as extensor plantar reflexes; these changes were reversible with prompt resuscitation. (2) Recurring hypoxia from repeated exposure giving recurrent symptoms—headache, drowsiness, inattention, sometimes with ataxia and cramp-like muscle pains. (3) Severe and prolonged poisoning with permanent neurological and mental symptoms, of which Parkinsonism and dementia were common. When mental symptoms occurred they were present at once after recovery from coma: the so-called "latent period" before dementia was evident was due simply to masking of symptoms by a protected hospital environment.

The New Insecticides

Dr. A. M. G. CAMPBELL (Bristol), speaking on the new insecticides and the nervous system, said that the organic mercurial compounds such as methyl mercury caused a picture differing from that of the inorganic. Tremors, peripheral neuropathy, cerebellar signs, visual field defects, and dementia might all occur. The danger here was recognized, and these products were less used than formerly. The use of D.D.T. was now very widespread, and though safe in powder form was relatively easily absorbed, even through the skin in oily solution. It might then cause a severe polyneuritis more motor than sensory. Organic phosphorus compounds such as parathion were also widely used. These seem to produce their effects via cell enzyme systems, by inhibiting cholinesterase. The results were muscular weakness and fasciculation, abdominal colic, and diarrhoea. Sometimes after recovery from acute poisoning signs of lower- and upper-motor-neurone lesions occurred days or weeks later. When this happened some impairment of normal myelin formation seemed to occur, and the information gained about the biochemistry of this might prove to be of great interest and importance. Dinitro-orthocresol and dinitrophenol might cause muscular weakness and wasting, but their main toxic effect (and they were occasionally rapidly lethal) was general tissue breakdown with marked rise in the basal metabolic rate. Pentachlorophenol, recently used as an insecticide, could also cause a polyneuritis.

In the subsequent discussion Mr. D. W. C. NORTHFIELD (London) asked how the medical attendant was to know in a non-fatal case that the clinical effects noted were due to toxic neuropathy. In reply, Dr. CAMPBELL said that biopsy and necropsy material, the upset of pyruvate metabolism that could be demonstrated biochemically, and the response to the suspected toxin in several otherwise unlinked cases had all suggested this.

Metallic Poisons and the Nervous System

Dr. J. W. ALDREN TURNER (London) was unfortunately unable to attend owing to illness, and his paper on "Metallic Poisons and the Nervous System" was read for him by Dr. C. W. M. WHITTY (Oxford). Upsets of copper metabolism in hepato-lenticular degeneration had recently been described, but neurological involvement in copper poisoning had never been reported. Manganese poisoning, however, did give a neurological picture like Wilson's disease, and there was also liver involvement. The conditions were, in addition, pathologically similar. Mercury poisoning was not uncommon and caused tremors and a curious condition of tiredness, anxiety, and excessive embarrassment and irritability known as erethism. This condition in workers in the felt-hat industry, where mercury nitrate was used, probably gave rise to the phrase "as mad as a hatter." Filling mercury thermometers, taking finger-prints with grey powder, and cleaning direct-current electric meters were other occupations exposed to this hazard: while mercury teething powders had been suggested as a cause of pink disease in babies.

Lead-poisoning was now a rare industrial risk owing to legislation in this country. However, occasional cases occurred from unusual sources, such as lead paint on cots and toys, the lead nipple shield, and, potentially at any rate, the iced lolly made in a metal mould. When lead palsy occurred it was curiously limited to those muscles most used, even when they had no common nerve supply. This suggested that the lesion was primarily in muscles. More recent work had pointed to a biochemical lesion—an interference with resynthesis of phosphocreatine in the muscle itself—as the probable cause of the palsy. Biochemical research had also led to an advance in the treatment of lead-poisoning. The usual methods sought to increase deposition of skeletal lead in the acute stages with later controlled mobilization, by low calcium intake, ammonium chloride, or dimercaprol. Recently chemical compounds—ethylenediamine acetic acid was one—which could combine with metals to form a soluble but non-ionizing compound—a chelate—had been used with some success to mobilize the lead and transport it in a non-ionized and therefore physiologically inert form.

Brain Abscess

Mr. J. ERIC PATERSON (Glasgow), in a paper "Brain Abscess before Penicillin," mentioned Macewen's classical work in this field done in Glasgow over 50 years ago. He pointed out that the results—25 cases, 19 operations, 18 recoveries—were still impressive by present-day standards. The cases were almost all temporal lobe abscesses of otitic origin. He always insisted on gentleness in opening up the mastoid, condemning mallet and chisel and using special gouges and drills. Thorough drainage in addition to the mastoid opening, careful removal of sloughs, and careful selection of cases were some of the reasons for his success, but the speaker thought that an element of good luck was also important. After Macewen, results were not so good, partly because his careful technique was neglected, but also because cases were less carefully selected and often more acute. Improvements followed better localization by ventriculograms, King's marsupialization technique, and Vincent's simple decompression for acute abscesses, while sulphonamides helped to control active infection. But results in general remained unsatisfactory.

Mr. WALPOLE S. LEWIN (Oxford), speaking on the present position, said that even since the introduction of penicillin and other antibiotics a brain abscess remained a major calamity and its management might be difficult. He quoted mortality figures for the Oxford school of neurosurgery: 46% in 1938–43, 29% in 1944–9, and 20.5% in 1950–4. The marked improvement after 1944 was due largely to penicillin, and the further small improvement to careful attention to details of technique and management. Repeated aspiration of the abscess, sometimes with preliminary decompression, local and general instillation of penicillin, and radiological inspection of the course of the abscess after injections of "thorotrast" into the cavity, were the mainstay of treatment. Later the abscess capsule could be excised if this would not cause further damage to brain function. Early diagnosis was important, and, in addition to a full neurological examination, E.E.G.s and angiograms were often helpful. Mastoid and paranasal infections remained the largest source of these abscesses, but metastatic sepsis from lungs was not uncommon and the prognosis of these abscesses was always worse. Of residual disabilities, epilepsy was the major risk, and in most series of cases amounted to about 50%.

Discussion

In discussion, Professor O. V. JOOMA (Pakistan) said irreversible brain oedema was a problem and sometimes caused early death even when antibiotics and aspiration had been started. It was curious that the incidence of later epilepsy was about the same as that seen in penetrating brain wounds. Frontal abscesses seemed specially liable to produce status epilepticus. Once fits had occurred prolonged anticonvulsant treatment was essential. Mr. G. K. TUTTON (Manchester) suggested that Macewen's success might be attributed to his cases being chronic ones. He mentioned a study of the bacteriology of brain abscesses which showed that almost all the organisms were susceptible to penicillin in high concentration, and that the concentration with local instillation fell so rapidly that this should be repeated frequently to get the best results.

SECTIONS OF OCCUPATIONAL HEALTH AND OPHTHALMOLOGY

Friday, July 9

Employment of the Visually Handicapped

With the president of the Section of Occupational Health, Professor THOMAS FERGUSON (Glasgow), in the chair, Dr. WILLIAM HUNTER (Glasgow) opened a discussion on the employment of the visually handicapped. He said that the aim in placing a person in employment was to provide a task commensurate with physical and mental ability, matching aspiration, and ensuring adequate reward. He assessed the size of the problem by correlating information from various sources, drawing special attention to the problem of future years on the average age of the working population increased. Once visual acuity had been determined it had to be equated with the requirements of a job. Jobs could be classified into one of three groups: dangerous, those requiring accurate vision, and those requiring no unusual visual aptitude. Factors adversely affecting visual performance were discussed, including illumination, accidental injury, and exposure to systemic poisons having a local effect on the eye. Training for the job was emphasized, and in the case of the blind it was pointed out that the Minister of Labour and National Service was empowered to provide training facilities and to arrange for permanent employment.

Mr. E. GORDON MACKIE (Sheffield) said that most local authorities had made schemes under Section 29 of the National Assistance Act, 1948, to extend to the partially sighted the services provided for the blind. Candidates for benefit had to be examined and form B.D.8 completed. He stated that at the end of 1952 the total number of partially sighted people between the ages of 5 and 49 on the Register was under 3,700, divided into three groups: near and prospectively blind, industrially handicapped, and children. Those who became partially sighted did so usually as a result of sudden visual loss, and they required rehabilitation as the first step in training them for employment in open industry or under the Disabled Persons (Employment) Act, 1944. The fate of the disabled worker depended mainly on good fortune in finding a suitable job and on personal enterprise, but an interested ophthalmic surgeon could favourably influence his future.

A short paper was read on "Colour Vision in Industry" by Dr. JAMES H. BELL (Glasgow), who said that maturity and old age might be reached without awareness of the presence of a colour perceptive defect. Rigid standards applied to entrants to transport services on land, sea, and in the air, and also to telephone and radio-engineers, who used colour codes on wire corers. The average worker in industry, however, did not require excellent colour vision, especially when guides other than colour were usually employed. Examples in the dyeing, paint, and weaving industries were given to show that in some workers normal colour vision was essential.

Dr. ARCHIBALD R. MILLER (Glasgow) spoke on the Blind Certifying Clinic, which he described as the doorway to the blind register. With a view to uniformity of certification, the Department of Health and the Scottish Education Department issued a joint memorandum in 1931 laying down standards of blindness and a form of medical certificate still in use to-day. He said that a certified blind person desiring technical training was interviewed by the manager of the workshops, and if thought suitable he was medically examined. Both civil and industrial injury as a cause of blindness had declined during the last thirty years.

Mr. JOHN T. STEWART (Glasgow) gave a paper on the Royal Glasgow Asylum for the blind. In the workshop providing facilities for the employment of suitable blind persons in terms of the Blind Persons Act, 1920, there were, according to Dr. Stewart, 295 blind journeymen and women together with 37 trainees. The average wage was £6 6s. per week for males and £4 14s. 5d. for females, but additional amounts could be earned through a bonus scheme. A wide variety of trades was practised by the blind inmates and, although the scheme ran at a deficit, some £165,000 per annum was the total sales turnover. Aged blind were accommodated at Cairnhill House, Airdrie.

Dr. M. E. M. HERFORD (Farnham Royal) spoke on "Eye Defects of School Leavers seen by an Appointed Factory Doctor." Sixty per cent. of school leavers were found to enter industry, giving rise to 2,000 individual examinations annually in his area; 9% of the children suffered from faults of eyesight, and 3% required some action to be taken. Some typical cases were quoted, including cases of strabismus.

SECTION OF OPHTHALMOLOGY

Friday, July 9

Ocular Headache

The president, Professor W. J. B. RIDDELL (Glasgow), welcomed the members from the chair and proceeded to open a discussion on ocular headaches by reading a paper. He said that in a discussion such as this it was essential to consider the general aspect of pains in the head before attempting to assess the more specialized ocular type. Indeed, the aches and pains of the body were frequently more relevant to the headache of which the patient complained than was the local state of the eyes. In general practice more patients were said to complain of headache than of any other single symptom, and, judging by the lavish advertising of headache cures, this might well be true. Headache was a protean symptom which might mean anything from a convenient social excuse to impending dissolution. Consequently the patient had to be allowed to tell of his headache in his own way; in many instances this made it possible to decide where the organic cause lay. Rheumatic and neuralgic headaches were not readily mistaken for those of ocular origin, although migraine neuralgia might arise around the orbit. Inflammation and pain in the globe itself made the associated headache clearly secondary. The more prolonged ache from old blind eyes was usually correctly diagnosed by the patient. Headaches were often caused by wearing glasses, and presbyopic myopes could be cured of their headaches by discarding glasses. Universal education, popular journalism, and the idea of eyestrain from reading arose concurrently in the community. The main sufferers from ocular headache were young long-sighted people without glasses. Difficulty in aligning the two eyes was a cause of dizziness rather than of headache.

Professor Riddell then vacated the chair in favour of a vice-president, Mr. C. DEE SHAPLAND, who asked Dr. G. G. ROBERTSON (Glasgow) to read his paper on ocular headache from the standpoint of general practice. He confined his remarks to the patient who thinks that his or her headache derives from a fault in the eye correctable by the wearing of a suitable lens. Of those patients who requested permission for an eyesight test, half of them stated that their vision had become defective, and less than 5% of this group admitted to headache. The other half desired glasses on account of headache, but, with the exception of a small proportion, these patients had no difficulty in seeing. Four typical case histories were recounted and they suggested that headache was often the product of fatigue, mental rather than ocular. This was likely to arise when there was a concomitant emotional factor. In the discussion Dr. JOHN ELLISON (Scarborough) said that the complaint of headache in children was rarely due to eyestrain and that in older children acidosis was a common cause. He also referred to presbyopic headache. Dr. P. N. SINHA (Patna) stated that a positive Wassermann reaction was a common finding in association with persistent headache, and that vitamin-B deficiency was another common aetiological factor in his country. Monocular workers also tended to get headaches.

Trachoma

Dr. D. CHRISTISON (Glasgow) was called upon to read a paper on trachoma by the late Dr. S. SPENCE MEIGHAN (Glasgow). The history of the disease was outlined. In

Britain it was said to be rare and sporadic, being mainly, but not exclusively, confined to imported cases and the foreign population. In 1914, owing to the occurrence of active spread of the disease in an industrial school, the disease was made notifiable in Glasgow. A central clinic was established to which all cases were referred, and special beds were made available at Stobhill Hospital. The course of the disease was then outlined, and statistics quoted to show the steady decline in incidence of the disease in Glasgow. In 1954 there were 105 cases on the Trachoma Register, 30 of which had been on the Register for 25 years or more. The bulk of the cases were notified during MacCallan's Stage IV. Three-quarters of them still had good or useful vision sufficient to make them employable. Nine of them were blind. Trichiasis and entropion were the commonest complications. Dr. Spence Meighan's experience had been that there was no specific cure for the disease, an opinion he based on the presence of inclusion bodies after prolonged use of antibiotics and sulphonamides.

Field Defects in Disseminated Sclerosis

Dr. R. J. MCWILLIAM (Glasgow) read a paper on "Field Defects in Disseminated Sclerosis," which he said presented a picture of the functional damage caused by the disease process. Dividing the defects into severe and minimal, he said that the commonest type in the severe group was the central scotoma of acute retrobulbar neuritis. In a series of 40 cases, over one-third showed full recovery. Of the remainder, under half regained a useful level of vision. Less common scotomas were the nerve fibre bundle, sector-shaped, and ring defects. Paracentral scotomas had long been recognized in cases showing minimal damage. Some of these defects were fixed and some fleeting, due to temporary vasoconstriction. Pathologically, plaques of demyelination in the optic nerve were more common than field defects. Lesions were not infrequent in the optic tracts, yet homonymous hemianopsia was rare. In the discussion it was suggested that some extra factor, possibly of a toxic or allergic nature, differentiated a lesion causing an acute neuritis from one producing only a small scotoma. The latter was regarded as the basic lesion of the disease, and superimposed upon this pattern was the massive response due to differences in the causal lesion, or to a difference in the response of the patient's tissues. The central fibres of the optic nerve appeared to be particularly susceptible.

SECTION OF ORTHOPAEDICS

Friday, July 9

Poliomyelitis

Under the chairmanship of the newly elected President of the Royal College of Surgeons, Sir HARRY PLATT (Manchester), the discussion was opened by Dr. T. ANDERSON (Glasgow) on the management of the infectious phase of poliomyelitis. He began with a plea for simplicity in examination to avoid unnecessary disturbance of the child and to gain at once the confidence and affection of the patient. Expressions suggestive of alarm and anxiety were to be avoided for the sake of both parents and child. Leading points in the history were prodromal illness, contact, trauma, overexertion, and intramuscular injection. The differential diagnosis included diseases of the C.N.S. such as encephalitis, polyneuritis, and tubercular meningitis; and, in other systems, upper respiratory tract infections, trauma (head and limbs), osteomyelitis, and acute rheumatism, while hysteria was occasionally encountered.

The best place for primary observation was the infectious diseases hospital. He had arranged to notify an orthopaedic surgeon of all cases of poliomyelitis, thus enabling him to follow them from their onset and consider their disposal and treatment in advance. For every 100 patients suspected of poliomyelitis, in 30 the diagnosis was not confirmed, and 30 developed no paralysis. Of the 40 paralysed cases, 10 were minor and could be treated as out-patients, and 30 required orthopaedic care, usually being transferred to an orthopaedic centre. In the early stages simple splints of Cramer wire as light as possible were used, and splintage was avoided whenever possible. Passive movements were started after the cessation of pain, and then gentle contractions of the minimally affected muscles.

Prevention of Deformity

Mr. J. M. P. CLARK (Leeds) then spoke on the prevention of deformity. It was, he said, better to prevent than to correct deformity, and it should be recognized that physiotherapy did not prevent deformity but often by overstimulating the unaffected muscles tended to increase it. All worthwhile recovery was present at the end of six months, and the surgical adjustment of imbalance could be left till the end of this period. Deformity was caused by (1) pain, which might be acute; (2) muscle spasm, which was infrequent; and (3) fibro-elastic tissue contracture. As to this, the disease should be regarded as a disease of collagenous tissue, the changes being early and rapid and out of proportion to muscle wasting. The tissues most affected were the plantar fascia, the tendo Achillis, the ilio-tibial band, the hamstrings, the lumbo-dorsal fascia, and the peri-articular ligaments of the spine. Less affected were the infra-patellar tissues, the pectoral muscles, teres major, and pronator teres. Stretching caused destruction of muscle fibres, and the range of movement necessary for muscle action was all that should be used. Muscles should never be stretched in the final stages. In the phase of potential recovery deformity was caused by (1) fibro-elastic tissue contracture; (2) muscle imbalance; and (3) disordered muscle action. Flexion deformity of the hip, for example, was often caused by contracture of the ilio-tibial band, and this could be diagnosed by the loss of the flexion at the hip in wide abduction of the leg. Surgical division of the ilio-tibial tract 4 in. (10 cm.) above the knee was the correct treatment. In some paraplegics tissue contraction contributed to stability, and some consideration should be given to this aspect before it was relieved. Muscle rehabilitation in the presence of muscular imbalance exaggerated the deformity. Early muscular transplantation was therefore necessary. The surgeon's duty was to anticipate deformity rather than to reconstruct after it.

Flail Limb

Mr. ROBERT ROAF (Liverpool) then spoke of the flail and shortened limb, enlarging on his experiences in India, where poliomyelitis was common and endemic. He confined his remarks to the more difficult aspects of the subject and to those in which the outlook had changed. Two fixed points on which all consideration should be based were, first, the inability to restore power to paralysed muscles, and, secondly, the need to treat the patient as a whole and with regard to his social, economic, and educational background. The standard forms of treatment were (1) appliances, (2) arthrodesis, and (3) muscle transplantation. Of appliances he would say only that they should be light and that it was seldom necessary to bridge the hip-joint. Arthrodesis should be carried out only if the joint was painful. If the patient was to wear a calliper, arthrodesis of the foot was of value only in enabling him to wear a shoe. Defective circulation in the paralysed limb did not occur in warm climates. It was necessary to keep the limb warm, and attention should be directed to the development of appliances which restored the cosmetic appearance of the limb and at the same time kept it warm. In scoliosis the exercise of weak muscles had often the undesired effect of strengthening the strong and of increasing the deformity. In limb inequality he favoured late femoral shortening. The arthrodesis of flail but mobile joints should not be undertaken lightly, and an appliance was usually preferable. Fixation of the joint temporarily in plaster in order to allow the patient to judge its effects was often worth while.

In the discussion which followed, Mr. I. S. SMILLIE (Dundee) emphasized the need to resist the encroachment on the interests of the orthopaedic surgeon, who had a part to play from the beginning. Dr. A. B. CHRISTIE (Liverpool), who

was in charge of a large infectious diseases hospital, supported this and offered his co-operation on the basis established by Dr. T. Anderson. Mr. J. D. MORGAN (Oxford) pointed out that scoliosis was in part due to a growth disturbance of the pedicles and processes, and that it was impossible to forecast the direction of the curve. The growth failure was due to circulatory deficiency.

Dr. T. ANDERSON, in reply, said he admitted that some scoliotics escaped from infectious diseases hospitals undiagnosed, but he believed the number was small. He felt there was some overemphasis on the problem of respiratory paralysis, which detracted from the importance of other aspects. A fresh orthopaedic attack on the design of splints and their reduction in weight should be organized. No complications in his experience had followed lumbar puncture which he had not seen in cases which had not had lumbar puncture, and he was not convinced that accidents after lumbar puncture were cause and effects. A normal C.S.F. was found in 5–10% of poliomyelitic patients.

Hallux Valgus

Two short occasional papers followed. First, Mr. A. MACDOUGALL (Glasgow) discussed the treatment of hallux valgus by arthrodesis. He had been encouraged to change from the more usual lines of procedure by the frequent recurrence of complaints, and the fact that in a certain number of cosmetic excisions of the bursa and underlying part of the capsule there was an increase in the deformity. The operation consisted in a reposition of the musculotendinous tissues round the head of the first metatarsal to prevent its adduction, and a sliding graft on the dorsum to fix the toe in 15–20 degrees of flexion. An essential prerequisite was a mobile terminal interphalangeal joint. He demonstrated the satisfactory appearance and function by showing two cases.

Professor G. PERKINS (London) pointed out that in the presence of claw-toes any operation for hallux valgus was followed by trouble. Mr. MACDOUGALL replied that in these cases he supplemented the procedure by a flexor–extensor transplant of the toes.

Penicillin Nerve Lesions

Mr. A. R. PARKES (Glasgow) presented a short "tail-piece" on penicillin nerve lesions, of which he had seen ten cases and reported in detail on five of them. He compared the slaughter of the nerve fibrils by penicillin to that of the Macdonalds by the Campbells at Glencoe. The radial and sciatic nerves were most commonly involved, and there was a disappointing lack of recovery. To avoid this complication the injection should be given in the upper and outer quadrant of the buttock, or of the deltoid region of the arm.

SECTION OF PHYSICAL MEDICINE

Friday, July 9

Recent Developments in Rehabilitation

With the president, Dr. W. S. TEGNER (London), in the chair, Group Captain C. J. S. O'MALLEY (London) opened a discussion on recent developments in rehabilitation. He began by defining rehabilitation as a process whereby a man is made mentally, physically, socially, vocationally, and economically equivalent to his state before he became sick or injured. Its aims were not only the restoration and maintenance of full physical and psychological function, but also an assessment of the patient's capacities, both actual and potential. Group Captain O'Malley then proceeded to a brief description of the organization and results obtained at Garston Manor Rehabilitation Centre. Free exercise was the most important part of the regime, since attachment of the patient to therapeutic machinery did not provide the right atmosphere. It was important also to equate work therapy to the normal occupation of the patient, and to provide a vital competitive spirit. An analysis of the patients who had attended Garston Manor during the period 1951–2 showed that over 77% had been returned either to their original occupations or to satisfactory occupations suited to their disabilities. Under 2% made no progress, and these patients were nearly all involved in compensation claims for their injuries. Group Captain O'Malley ended by saying that a suitable motto might be "Rehabilitation always, resettlement sometimes, and retraining as infrequently as possible."

Dr. F. S. COOKSEY (London) discussed some aspects of the social welfare of disabled patients. He stressed the importance to them of freeing themselves from dependence on nurses and relatives in the personal activities of daily living. Dr. Cooksey then showed several simple appliances which facilitated the dressing, feeding, and toilet of the disabled. An additional important measure was the establishment of social resettlement clinics to deal with the more difficult social problems. This clinic could be conducted by the same team as the industrial resettlement clinic, except that the disablement resettlement officer was replaced by the district health visitor and the district welfare officer. These resettlement clinics seemed to be one of the most effective ways of integrating the various services concerned with the medical care, rehabilitation, and social and industrial resettlement of convalescent patients.

Lieutenant-Colonel JOHN FRASER (Inverness), whose paper was read by Dr. M. FLETCHER (Giffnock), then described the work of the Astley Ainslie Hospital in Edinburgh. He made a plea for the efficient combination of occupational therapy and physical therapy in the conduct of rehabilitation. In addition he stressed the importance of the continuity of treatment, from the purely medical phase to the completion of the process of rehabilitation. Out-patient rehabilitation had many disadvantages which could be overcome by the establishment of convalescent hospitals.

Group Captain J. S. CARSLAW (Glasgow) suggested that the term "hospital" should not be used for centres of this type. Dr. G. G. BROWNING (Glasgow) made a plea for the use of rehabilitation as a preventive measure in keeping the elderly and chronic sick from becoming a charge on the State.

Management of Degenerative Joint Disease

In an opening paper on this subject Dr. H. A. BURT (London) said that degenerative joint disease should be regarded almost as a physiological rather than a pathological state; in all but a fraction of cases the disease was clinically silent. Pain and stiffness were the result of thickening and fibrosis of the capsule, and impairment of function arose not only from this but also from alteration in joint structure and the muscular wasting which accompanied severe joint disease. Intra-articular hydrocortisone had a limited but useful part to play in treatment. Of great importance was a plan of treatment intelligently carried out by patients themselves at home.

Dr. LOGIE S. BAIN (Aberdeen) discussed the conservative treatment of osteoarthritis of the hip-joint. Among other general measures, limitation of stress and strain, correction of obesity, and provision of adequate rest were important. Phenylbutazone was useful in some cases, although its haphazard prescription was fraught with danger; careful selection of cases was essential, and the minimal effective dosage should be used. Physiotherapy, including regular home exercises, was usually beneficial. Deep *x*-ray therapy produced symptomatic relief in about 50% of cases, but intra-articular injections were of very limited value, and any benefit was usually only temporary. Hydrocortisone, however, gave more promising results, provided the drug was injected into the actual joint space.

Dr. DONALD WILSON (Chichester) discussed the treatment of osteoarthritis of the knee-joint. Among other general measures correction of varicosities was important. Manipulation was indicated to overcome patellar adhesions or to free impacted loose bodies. He had found phenylbutazone of value in patients who were resistant to salicylates, and the prescription of magnesium trisilicate would often relieve

the dyspepsia which sometimes accompanied the use of this drug. Dr. Wilson agreed with the previous speakers that hydrocortisone gave promising results.

In the subsequent discussion Squadron Leader C. B. WYNN-PARRY (Farnham Common) asked why strengthening of the quadriceps muscle so often relieved pain. Group Captain O'MALLEY (London), thought that this was because instability was reduced. Dr. BURT said that hamstring spasm was sometimes a cause of pain, and that strengthening the quadriceps might relieve this spasm. Dr. G. G. BROWNING (Glasgow) suggested that hyperaemia was a cause of pain in osteoarthritis. In support of this theory he had noted that the control of varicosities relieved pain, and also that in many cases warmth in bed increased the pain. It was particularly in the latter cases that deep *x*-ray therapy seemed helpful.

Electrodiagnosis

Professor A. E. RITCHIE (St. Andrews) discussed the electrical tests of denervated muscle under three headings. (1) Electrical stimulation could be carried out by several different techniques—that of recording intensity-duration curves with low-impedance "square" shocks appeared to be the most generally useful. (2) Electromyography was now well established as a diagnostic method; its difficulty lay in the presentation of results. (3) Additional methods, such as measurements of reflex vasodilatation and sweating, cold pressor tests, and nerve conduction velocity deserved more attention. From appropriate combinations of such electrodiagnostic methods not only could diagnosis and therapy be improved but knowledge of the human neuromuscular system could also be advanced.

Squadron Leader C. B. WYNN-PARRY (Farnham Common) said that the aim of the intensity-duration curve was to measure the characteristic excitability response of the tissue being electrically stimulated. The curve obtained might be typical of the response of nerve, or of muscle, or of a combination of the two. It was therefore possible to conclude whether the muscle was normally innervated, totally denervated, or showed partial innervation. Older methods, such as the rheobase and chronaxie tests and the faradic-galvanic tests, were only abbreviations of the intensity-duration curve, and should now be replaced by this method.

Dr. A. T. RICHARDSON (London) said that electromyography alone was no substitute for the plotting of intensity-duration curves in peripheral nerve injuries: it was, however, essential in the investigation of non-traumatic lesions of lower motor neurones and muscle fibres. Standard techniques had yet to be improved upon, and such elaborations as film or magnetic tape recording and frequency analysis might eventually become standard. Studies of motor unit potentials in minimal and on full volition might indicate that the site of any lesion was in the anterior cell (myelopathic), the peripheral nerve (neuropathic), or the muscle fibre (myopathic).

SECTION OF PSYCHIATRY

Friday, July 9

Depression

With the president, Professor T. FERGUSON RODGER (Glasgow), in the chair, Dr. W. MAYER-GROSS (Dumfries) opened a discussion on depressive states. From the point of view of diagnosis depression could be defined as a subjective or objective inefficiency of all mental activities, experienced in a mood of sadness. Depression was probably the commonest type of complaint in psychiatric patients to-day. In the last twenty years the presenting symptoms of neurosis had undergone change and the clinical picture of depression had largely replaced the neurasthenic and hysterical symptoms of former generations. The increased expectation of life had led to a greater probability of mental breakdown for many people, and in later life this often took a depressive form.

In order to plan treatment it was essential to differentiate the reactive, neurotic form of depression from the endogenous variety which came on with little relation to environmental factors. Now that physical methods of treatment, and especially electric convulsion therapy, could bring rapid relief in some cases, accurate and early diagnosis was essential. This method was not, however, to be regarded either as applicable to all depressed patients or as a complete symptomatic treatment in itself. It had to be used only when appropriate, in combination with other measures. In the middle-aged, depression often appeared in the guise of anxiety symptoms, or, where the patient already had some physical weak spot, in the form of a functional exaggeration. Its presence might be indicated by frankly hysterical conversion symptoms. In such patients recurrent "bilious attacks," symptoms of cardiac neurosis, headaches, or climacteric flushings and palpitations might be attributable to an underlying depression. Sometimes physical treatment could bring about a rapid recovery after prolonged attempts at purely psychological treatment had failed.

In the aged it was important to differentiate the inefficiency of mind due to depression from the effects of senile dementia and arteriosclerosis. The former often responded well to physical treatment, and realization of this would allow some elderly patients to return to normal life with relief of the strain on relatives or on hospital accommodation.

The Risk of Suicide

Dr. E. STENGEL (London), in a paper on the risks of suicide in depressive states, pointed out that the advances made in psychotherapeutic methods and in the general treatment of mental disorders had not so far led to a reduction in the frequency of suicide. While practically every suicidal act was associated with a depressive mood, not more than a third of those who committed suicide were in fact suffering from frank mental disorder. Reactive depression was responsible for the greatest number of suicidal attempts among the general population, and endogenous depression was the commonest cause among patients referred to the psychiatrist.

No type of depression was free from the risk of suicide. In assessing this risk one had to take into consideration factors of age, personality, and social background. Those who attempted suicide and those who committed suicide formed two overlapping groups which differed considerably in the representation of the sexes, in age, and in the methods used. There were roughly seven suicidal attempts to one suicide. Of those who succeeded only a minority had made attempts before. Follow-up studies of those who made unsuccessful attempts suggested that relatively few finally killed themselves.

In planning the prevention of suicide, the psychiatrist had to consider, besides the clinical form of the depression, the prevailing attitudes in the patient's social group and the patient's individual motives, including the meaning of the act to him and his idea of the effects it would have on others. Psycho-analytic research was adding to knowledge about the significance of the act of suicide to the individual and the importance of symbolic acts which might be considered as equivalents of suicide.

Treatment of Depression

Dr. I. R. C. BATCHELOR (Edinburgh), in giving a general account of the treatment of depression, pointed out that it was difficult to assess the effects of treatment because of the self-limiting nature of the illness. The main need was to reduce the patient's life to a simple level for the time being, to bring his physical state to the optimum possible, and to reassure him without goading him to return to his problems. In many patients initial bed rest appeared to help greatly and occupation was essential to maintain the patient's confidence. The mechanical application of E.C.T. to all patients showing depressive symptoms was to be condemned, and psychotherapeutic help was essential, especially in

convalescence, where the opportunity should be taken to help the patient to solve his conflicts and to plan for the future.

A period of 14 days' initial rest and investigation was desirable when E.C.T. was to be used, and daily contact with the physician was essential throughout. Most patients having E.C.T. required treatment in hospital, and relaxants should be given by an experienced anaesthetist as a matter of routine. The amphetamines still had a place in the treatment of the mild depressive. The chronic depression which failed to respond to E.C.T., to a psychotherapeutic approach, and to the hospital regime was still the main indication for prefrontal leucotomy, and this operation could produce very good results when all else had failed.

The Rationale of E.C.T.

Dr. D. A. POND (London) gave a general survey of the theoretical background of convulsant treatment. The position could be summarized by saying that the only rationale of E.C.T. was that it worked. It was unlikely that variations in the actual technique were of much importance. The convulsion produced was in most respects identical with the epileptic seizure. It was thus not electrotherapy that was the basis of the therapeutic effects, but epileptotherapy.

The effects of E.C.T. on the human organism were physiological and psychological. On the physiological side the theory of Roth, that there was a progressive alteration in cortico-thalamic relations during treatment, as well as the views of Jean Delay and of Cerletti, suggested that the main effects were on the basal regions of the brain, including the diencephalon. The endocrine effects could fairly be summarized as a response to stress in Selye's sense.

It seemed doubtful if the physical effects on brain tissue were as important as was thought at first, and it was of interest that in the responses by psycho-analysts to Dr. Hill's recent questionary indicated that they all considered that therapeutic brain damage was the main agent. After E.C.T. there were changes in the response to emotional stimuli and the reaction to revived memories. Depressive states behaved as if they were the manifestations of a rhythmical or tidal psychosomatic substrate, and E.C.T. was able in some way to influence this process. The remarkable specificity of E.C.T. suggested that there was a relationship, positive or negative, between the two processes. Whether epilepsy could be regarded as a general or a specific stress was difficult to decide in this respect. Only a broad biological approach taking in factors of both mind and body could lead to the solution of the problems which still remain.

Failures with E.C.T.

Dr. J. L. CAMERON (Glasgow) pointed out that patients who had failed to respond to E.C.T. formed an important section of the chronic nucleus of mental hospital patients. Prognosis was sometimes difficult and could not reliably be based on the symptoms alone but necessitated a study of the psychodynamics of the individual patient. A study of the personality and of the individual's previous response to the stresses of life had to be made in every case. A psychological approach might sometimes succeed where physical methods failed. In particular, group methods of treatment often helped with the patient who had shown little or no response to E.C.T.

Depression in the Industrial Worker

Dr. M. MARKOWE (London), in discussing the effects of depressive illness on industrial efficiency, said that in investigations carried out on semi-skilled and unskilled workers it had been shown that output had not necessarily been lowered. The worker with a sound previous personality was able to reduce the effects of his disability through his own resilience, and this view was borne out by comparison of the effects of depression on the employed and the unemployed. None the less, chronic unhappiness, especially in the constitutionally vulnerable personality, was bound to have its effect, and the early diagnosis and treatment of such a common disability as depression must surely play its part in the raising of industrial morale and efficiency.

Depression and Crime

Dr. J. C. McI. MATHESON (London), speaking from the point of view of a prison medical officer, said that many prisoners convicted of minor offences showed a depressive reaction when sent to prison, but depressive illness was not in his experience a common contributory cause to criminal behaviour. Even among those cases of attempted suicide which came to prison depression did not appear to be an important factor, but it had to be borne in mind that where the police realized that mental illness was present they did not arrest the individual but saw that he was placed under medical care. Attempted suicide as seen by the prison officer was therefore more often of a hysterical or demonstrative type. When the attempts were made in prison, letters to relatives or farewell notes often gave the clue to this kind of aetiology. One notable fact was the effect of the suicidal attempt in causing relief of the depression, and he had himself observed that relief was often more striking when much blood had been lost. The improvement which occurred after an attempt at suicide, and especially after a crime of violence associated with depression, increased the difficulties of the psychiatrist who had to examine the accused and report to the court.

Discussion

Dr. JAMES LECKIE (Aberdeen) referred to the difficulty encountered in persuading patients of the necessity to have electrical treatment and the similes he used in putting it to them. He acknowledged the value of the work of lay mental health officers who followed up cases and brought them up when treatment was necessary. He felt that the opinion of experienced mental nurses, that E.C.T. given with relaxants was not so effective, could not be ignored. Dr. P. G. MCGRATH (Ayr) criticized the view that E.C.T. strengthened repression. In his experience E.C.T. often produced disinhibition and an increased instinctual drive.

Dr. DONALD CAMERON (Edinburgh) found it difficult to think of a purely endogenous depression without environmental cause. He wondered whether the effect of E.C.T. on memory was the cause of its therapeutic success in depression. In an occupational morbidity survey he had found that suicide following depression was particularly common in some occupations—for instance, retail tradesmen and barristers. The psychotic depressive changed his job often while the neurotic stayed in the same work.

Dr. MURIEL BARTON HALL (Liverpool) emphasized the importance of distinguishing between the endogenous and reactive depressions. The experienced clinician could often detect the endogenous depressive at once; their responses during physical examination and to the first interview were typical. It was often not necessary to spend much time on preliminary investigation, as suggested by Dr. Batchelor, and one could give relief at once.

Dr. R. S. FERGUSON (London) said there were still indications for the use of chemical convulsants. In his experience there was less disturbance in the E.E.G. rhythms when these were used. Dr. J. B. W. ROWE (Harrow) referred to Dr. Matheson's observation about recovery from depression after attempts at suicide involving much blood loss and asked whether it was not the factor of surgical shock which produced the effect. In reply Dr. STENGEL said that bloodletting had been tried for centuries in depression without notable effect; and Dr. MATHESON said that shock had not been a marked feature in the cases he had seen.

In summing-up, Dr. MAYER-GROSS and Dr. POND both agreed that there was no reliable theoretical basis for the modern treatment of depression, but that both physical and psychological approaches might produce rewarding results. The only safe attitude was a broad psychological approach to the problem.

SECTION OF RADIOLOGY

Friday, July 9

Carcinoma of the Bladder

With Professor ROBERT MCWHIRTER (Edinburgh), a vice-president of the Section, in the chair, Mr. ARTHUR JACOBS (Glasgow) delivered a paper on carcinoma of the bladder. He emphasized that the wide variations of growth found in various types of bladder cancer made it important to ensure that like was being compared with like when assessing different methods of treatment. The classification of Dukes and Masina provided a satisfactory basis, but the depth of infiltration should also be included. Whatever the histology of a bladder growth, the mode of treatment was profoundly influenced by the tumour's gross characters, including its site, size, multiplicity, and spread. The alternative treatments were electrosurgery, radiotherapy (alone or in combination), partial and total cystectomy, and Mr. Jacobs discussed the application of these methods to 379 new patients presenting with bladder tumours at the Urological Department of Glasgow Royal Infirmary in the quinquennium ending in 1953. He believed it to be a fairly accurate generalization that, if a bladder cancer could be completely extirpated or made to disappear, the end results were not greatly influenced by the method whereby this was achieved. While partial cystectomy gave a 20% survival rate at six years, it was of limited application, since 80% of tumours are situated in the lower parts of the bladder. Interstitial radium was applicable to solitary sessile carcinomata in the lower part of the bladder if the tumour base did not exceed 5 cm. in diameter; of 110 cases treated, 37 had survived over five years. In recent years radon seeds had been used instead of radium. Twenty-six cases were so treated between 1950 and 1953; 18 were of the lower grades of malignancy, and 14 of these were now free from recurrence or new tumour formation, but eight tumours of higher-grade malignancy were uncontrolled by irradiation.

Despite the necessity for urinary diversion, total cystectomy had a place in the treatment of bladder cancer, but the choice should be on a selective basis. It could not be expected to succeed if extravesical spread had occurred. Out of 29 patients treated by cystectomy in the period 1949–53 24 were alive. The conclusion was that when the degree of malignancy was low, good results followed eradication of the growth by any of the methods described. It remained to be seen what modern external irradiation could achieve in the more extensive growths of higher malignancy.

Mr. G. W. BLOMFIELD (Sheffield) summarized the radiotherapeutic methods available for bladder cancer. A modern tendency was to use radon seeds or radioactive gold grains instead of radium for intestinal implantation, with closure of the bladder and catheter drainage only. Radioactive tantalum wire gave a radiation distribution like radium, but the bladder could be closed and the wire extracted per urethram. In the treatment of superficial lesions advantages were offered by a central source of radiation within the bladder: radiocobalt was convenient, and could be introduced by catheter without suprapubic cystostomy. Of the radioactive solutions at present available for use by intravesical balloon, radioactive bromine was the most suitable for treating the whole mucosa. Its handling required a special technique, but it offered an alternative to total cystectomy for multiple small lesions. Radioactive sodium, previously used, gave a smaller depth-dose to the bladder wall: the depth-dose from both radioactive solutions was, in fact, smaller than that from a central source of radiation. Ellis had recently advocated using radioactive colloidal gold, by ordinary catheter, in selected cases of superficial lesions.

In external irradiation the two significant developments were the advent of rotation therapy and a supervoltage *x*-ray therapy. Rotation therapy enabled a larger dose to be applied deeply without appreciable skin reaction, but the distribution of radiation was apt to follow a set pattern which might not coincide with clinical requirements. Supervoltage *x*-ray therapy (including megacurie cobalt units) offered immense advantages, including accuracy, convenience, and comfort to the patient. Two-million-volt *x* rays gave an almost ideal distribution of radiation for bladder cancer, and with still higher voltages there was some further gain by lessening skin dosage. A series of 163 cases had been treated at Sheffield by *x*-ray therapy during the period 1948–52, in the last two years of the period all cases being treated by supervoltage *x*-ray beam-directed methods; from the point of view of the patient's comfort and immediate prospects supervoltage therapy had the more to offer.

Leukaemia

Dr. R. BODLEY SCOTT (London), opening a discussion on this subject, thought the leukaemic patient was better served when his case was accepted as the common responsibility of radiotherapist and physician, and when they together planned treatment and followed his progress. Chronic myeloid and chronic lymphatic leukaemia differed widely in their clinical pictures and management. In chronic myeloid leukaemia remission was produced with relative ease in the early stages, but the improvement was transitory and the disease ran an average course of three to three and a half years. The leukaemic process itself was directly responsible for death in the great majority. Radiotherapy could produce temporary remission and give a period of normal life, but it could neither cure the disease nor prolong life. The patients reviewed had in general been treated with compact courses of splenic irradiation undertaken when symptoms, splenomegaly, and leucocytosis had all recurred. Irradiation was still the treatment of choice in the early stages of the disease; the patients appeared to feel better and remission to be more complete with radiotherapy than with chemotherapy.

Chronic lymphatic leukaemia provided several contrasts with the chronic myeloid variety. It was a disease of the elderly, one-quarter died of some unrelated condition, and more than one-third suffered from some other chronic disorder. Although the course was variable, general health might be preserved for months or years before deterioration had set in; once signs of marrow failure were apparent, complete remission was exceptional. The place of radiotherapy was to dispose of local lymphoid tumours. *X*-ray therapy should be reserved for this role, and nodal masses should not be treated unless they caused distress. Triethylene melamine and triethylene thiophosphoramide were indicated when progressive anaemia was combined with moderate generalized lymphadenopathy, but must be used with great caution because of their myelotoxic activity.

Dr. A. A. CHARTERIS (Glasgow) reviewed a series of 157 adult patients treated by *x*-irradiation between 1933 and 1953. Of these, 170 had had chronic lymphatic leukaemia; a high blood count did not affect their prognosis, and treatment (apart from getting rid of the lymphoid tumours) probably did not influence the course of the malady. Irradiation might be generalized or regional according to the distribution of the disease. Of the 70 patients 18 lived over two years, the longest periods being 12 and 15 years. Chronic myeloid leukaemia generally responded well to treatment by splenic irradiation and symptoms were readily relieved. But only 19 out of 87 patients lived over two years; the younger ones had a poorer prognosis, the presence of a high proportion of primitive cells was also ominous. Review of this series suggested that the cases with longest remission had had rather larger doses of *x* rays than usual, and it was suggested that the radiotherapist should not be guided by symptoms alone in terminating treatment but should attempt to reduce the blood count to normal or even below this.

Dr. S. P. RAWSON (Glasgow) described the bone changes occurring in leukaemia in childhood. Symptoms referable to bones and joints might be the presenting feature in leukaemia, and radiological changes might be identified at a stage when the clinical examination and blood picture were ambiguous. In a review of 56 cases of leukaemia at the Royal Hospital for Sick Children, Glasgow, changes in the bones consistent with leukaemia were found in just over half of the cases radiographed. They included osteolytic lesions,

periostitis, osteoporosis, osteosclerosis, pathological fractures, and (although not pathognomonic) clear zones and bands of diminished density at the metaphysial ends of long bones. Cases surviving longer periods were more likely to show bony changes, and the early radiographic signs might be confined to a smaller part of a single bone. In one case of monocytic leukaemia, which presented in the guise of acute rheumatism, the radiographs suggested the possibility of leukaemia five months before the blood picture became conclusive.

MEDICAL FILMS SHOWN AT GLASGOW

Two recent medical films were shown in the club-room at the Kelvin Hall during the Annual Meeting in Glasgow. The first was on the subject of hay-fever and was made by the photographic department at St. Mary's Hospital for Dr. A. W. Frankland of the allergic diseases department of the Wright-Fleming Institute. The second film, entitled "A Method of Corneal Grafting," was made by the medical illustration department of the Institute of Ophthalmology for Mr. A. G. Leigh. The hay-fever film is already available from the B.M.A.'s film library, and the other film will shortly be available.

ROYAL COLLEGE OF OBSTETRICIANS AND GYNAECOLOGISTS

SILVER JUBILEE

The silver jubilee celebrations of the Royal College of Obstetricians and Gynaecologists were held in London on July 13, 14, and 15. On the first morning an inaugural address was delivered by the President (Mr. ARTHUR GEMMELL), followed in the afternoon by the conferment of Honorary Fellowships, and in the evening by a reception which was attended by H.M. QUEEN ELIZABETH THE QUEEN MOTHER. On the following mornings the Fletcher Shaw and Blair-Bell Memorial Lectures were delivered.

At the inaugural ceremony the President, who was accompanied by the Vice-Presidents (Professor G. I. STRACHAN and Mr. ARTHUR JAMES MCNAIR) said that until 25 years ago their branch of medicine was in thrall to physicians or surgeons or both. Then the founders of the College established their charter of freedom, and in the years that had followed that event its Fellows and Members had shown themselves worthy. Their much older sister Colleges had accepted them and had insisted that they take their place beside them in the highest councils. One gift immediately provided the College with a focal point of corporate life—namely, the house in Queen Anne Street, the gift of Blair-Bell, opened by Queen Elizabeth the Queen Mother when she was Duchess of York.

The New College

Plans were in hand for the building of a new College, of which much would soon be heard. He did not regard such building as an end in itself, but as a means towards giving greater service not only to those in the United Kingdom but to men and women from overseas. Of the new College itself he would only mention that it would provide accommodation for a really good museum as a teaching instrument and for staff to conduct their enlarging activities. They must be constantly watchful to ensure that their standards of training and examination were maintained at a very high level, so that all would recognize the "M.R.C.O.G." as the only necessary hallmark that an individual was fully trained and experienced for all the situations which an obstetrician and gynaecologist might be called upon to meet.

He called upon them to solemnize this jubilee by renewing in their hearts the obligation they undertook when they joined the College. *Super Ardua Consurgamus: Floreat Collegium.*

The President read a number of messages of congratulation from the vice-chancellors of several universities, from the new President of the Royal College of Surgeons of England (Sir Harry Platt), and from various gynaecological societies and other bodies at home and abroad. He also received on behalf of the College some handsome silver plate and cheques from the Australian, Canadian, and New Zealand Regional Councils, the South African Registration Committee, the Gynaecological Society of Great Britain and Ireland, the American Gynecological Club, and other institutions.

Admission of Honorary Fellows

The admission of Honorary Fellows and presentation of Badges of Office took place at the Senate House of the University of London. A procession was formed at the top of the ceremonial stairs and entered the Beveridge Hall. When all were seated the President called upon Professor R. W. JOHNSTONE, Past Vice-President, to present the following four Honorary Fellows-elect: LORD SIMONDS (Lord Chancellor), Dr. DORIS GORDON, Dr. JOE VINCENT MEIGS, and Sir ARTHUR SIMS.

Speaking of Lord Simonds, Professor Johnstone said that he was one of the highest executive officers of state, and one of the very few who had reached that coveted eminence without having previously ventured into politics but solely owing to his extreme distinction as lawyer and judge. It had come as no surprise to his profession when he was chosen to be Lord Chancellor in 1951, and he had fully maintained the highest traditions and discharged the multifarious responsibilities of that office in a way that had won the admiration of the whole country. They were especially happy to elect Lord Simonds to Honorary Fellowship, since his work as their counsel had greatly helped the College when their application for registration was opposed by the two senior Royal Colleges. This opposition was, happily, a thing of the past.

Dr. Doris Gordon had had a distinguished career in New Zealand and had stimulated public opinion in the matter of progress in the field of obstetrics. She had pressed for the use of analgesia in childbirth and experimented with twilight sleep. She was the first woman from Australasia to obtain a Fellowship in any Royal College, and she was responsible for the foundation of the New Zealand Obstetrical Society and for the new Chair in Gynaecology in New Zealand.

Speaking of Dr. Joe Meigs, Professor Johnstone said that two-way traffic of obstetrical and gynaecological information between America and England had become a large and steady stream which was wholly beneficial, and in that realm of exchange the question of convertibility did not arise. Dr. Meigs was an American with close ties with Britain and the Commonwealth. He was a most distinguished surgeon.

Sir Arthur Sims personified the success story of the poor lad who achieved wealth and position. Both in the world of business and in the field of cricket he had achieved great heights. His mother had reminded him that of the man to whom much is given much is required, and Sir Arthur Sims had used his wealth for the benefit of education in science and medicine. He had nobly endowed his own university (Otago, New Zealand), and in this country he had done much for the cause of medical advancement, judiciously choosing the Royal Colleges as channels of his benevolence. The travelling professorships were mainly the outcome of his thought and generosity. Dr. Joe Meigs returned thanks on behalf of all four Honorary Fellows.

The President then presented Badges of Office to the Chairman of the Australian Regional Council and the representatives of the Chairmen of the Canadian and New Zealand Regional Councils. In speeches of thanks, the representatives from Australia and New Zealand expressed their pleasure that the President would be visiting them during the summer and assured him of a warm welcome.

Blair-Bell Memorial Lecture

The William Meredith Fletcher Shaw memorial lecture, delivered by Sir WILLIAM FLETCHER SHAW, took the form of a review of the College history from the first steps during the years immediately following the first world war. It included a glance into the future, especially the unified administration of the maternity services under the National Health Services Act, a principle for which the College had long been fighting.

The 17th William Blair-Bell lecture was delivered by Professor B. T. MAYES, of Sydney, and was entitled "The Making of an Obstetrician." He spoke of obstetrical work and teaching in Australia, where conditions differed from those in this country on account of geographical distances and also of the virtual absence of domiciliary obstetrics. Distances were overcome by the "Flying Doctor" service. Most of the obstetric cases were in the charge of general practitioners, but they attended them almost completely in hospital. Professor Mayes had also something to say about the personality of the obstetrician. He considered the bedside manner here to be particularly important. Wherever chivalry might be dead, it should be alive and in action here. He even stressed the importance of sartorial appearance, and said that the impression which the late Sir Ewen Maclean created in this respect on the occasion of the B.M.A. World Tour in 1935 was still remembered in Australia. He added that in Australia to-day the Royal College was highly regarded, and its diploma was recognized as the hallmark of the highly trained man.

The Dinner

On July 14 the President of the College and Mrs. Gemmell welcomed a large number of guests at the Silver Jubilee Dinner at the Dorchester Hotel. Among those present were the Minister of Health; the President of the Royal College of Physicians of London; Sir Stanford Cade, representing the President of the Royal College of Surgeons of England; the Presidents of the Royal College of Surgeons of Edinburgh, the Royal College of Surgeons in Ireland, the Royal Faculty of Physicians and Surgeons of Glasgow, the General Medical Council, the Royal Society of Medicine, the British Medical Association, the Medical Women's Federation, the British Paediatric Association, and the Royal College of Midwives; the Master of the Society of Apothecaries; and the Chairman of the Central Midwives Board.

The guest of honour was Lord Simonds, the Lord High Chancellor of Great Britain, and in proposing the toast to the College he spoke of the great pleasure it had given him when on the previous day the President had conferred on him the Honorary Fellowship of the College. Those responsible for presenting the petition for incorporation in 1929 had not had an easy course to run, for they were staunchly opposed by the Royal Colleges of Physicians and Surgeons, who said they did not want a younger brother. But now all that was forgotten and they were regarded with fraternal affection. The growth of the College in 25 years had been remarkable, and, alone of the Royal Colleges, the College of Obstetricians and Gynaecologists had regional councils all over the Empire—"Many little links make a strong chain." The infant was now breaking out of its swaddling-clothes, and no doubt a glorious future lay before the College, which would soon be housed in a spacious mansion in Regent's Park. The welfare of mothers and children made the most powerful claim of all on the resources of medical science.

Before the President replied to the toast he was presented with specially bound copies of two recently published books (*Twenty-five Years: The Story of the Royal College of Obstetricians and Gynaecologists, 1929–1954*, and a *Historical Review of British Obstetrics and Gynaecology, 1800–1950*) by the two surviving signatories of the Articles of Association on which the College was incorporated—Sir William Fletcher Shaw, the author of the first book, and Professor J. M. Munro Kerr, co-editor of the second.

The President then reviewed the history of the College and recalled in homage the names of the previous presidents. The Fellows and Members, he said, had themselves financed the day-to-day activities of the College, but now a Commonwealth-wide appeal had been launched for £400,000 for the purpose of building, equipping, and maintaining the new headquarters in London. His own personal hopes were that the museum would be developed until it became the foremost of its kind in the world.

Mr. A. C. H. Bell, proposing the health of the guests, gave a particularly warm welcome to the members of the American Gynecological Club who were present and to Dr. Doris Gordon, of New Zealand. In reply, Sir Ronald Weeks thanked his colleagues in industry for the way they were helping the College to raise the funds needed for the new building, and he paid a special tribute to the efficiency of the permanent staff of the College. Sir Russell Brain also replied for the guests.

THE BUCKSTON BROWNE RESEARCH FARM

[BY A SPECIAL CORRESPONDENT]

On July 7 the Buckston Browne Research Farm of the Royal College of Surgeons was thrown open to visitors, and Professor DAVID SLOME, the College's Bernhard Baron Research Professor, and his team of workers demonstrated their current researches. Later in the day visitors returned to the Royal College of Surgeons for a lecture by Professor Slome, in which he spoke on the history of experimental surgery. In particular, he described the progress that the Buckston Browne benefaction had made possible.

Hypothermia

At the farm, Dr. H. C. CHURCHILL-DAVIDSON, Dr. I. K. MCMILLAN, Dr. D. MELROSE, and Mr. R. B. LYNN are endeavouring to solve some of the problems which arise when tissue metabolism is reduced by lowering the body temperature. All investigators in this field have found that cardiac arrhythmias, especially ventricular fibrillation, are frequent and often lethal consequences of cooling. Two factors appear to be concerned in producing fibrillation—the degree of cooling and manipulation of the ventricles. Above 26° C. the dog's heart does not fibrillate unless the ventricles are traumatized; the great vessels can be clamped or the auricles opened without fear. Below 20° C. fibrillation occurs spontaneously in 25% of animals. It has been thought that the low oxygen-carrying capacity of the blood at low temperatures might be a causative factor. This group of workers have devised a pressure chamber in which animals are subjected to pressures in the region of 70 lb. per sq. in. (5 kg. per cm.^{2}). In an atmosphere of pure oxygen at this pressure enough of the gas goes into solution in the plasma alone to supply the needs of the cardiac muscle. Although the E.C.G. changes produced by cooling are decreased, the incidence of fibrillation remains unaltered. The conclusion is that hypothermia has not yet been sufficiently perfected to allow unhurried cardiac surgery without serious risk.

Vascular Reconstruction and Kidney Transplantation

Valve construction is another aspect of vascular surgery being studied at the farm, by Dr. I. K. MCMILLAN and Mr. G. K. HARRISON. A valve can be made in the aorta by transecting the vessel and using one of the divided ends to fashion flaps. Vascular continuity is reconstituted by means of a graft. However, after functioning for a short while artificial valves of this type have a tendency to become adherent to the walls of the vessel.

Another exhibit was a synthetic material called "orlon," which has been used for making arterial grafts. When a tube of orlon is grafted into an artery, blood exudes from the

interstices of the fabric for a few minutes, but soon stops. A film of fibrin is deposited on the inside of the material over which endothelium grows. The fabric seems to cause little tissue reaction and does not lead to thrombus formation. A graft was demonstrated which had been removed four weeks after insertion. In America grafts are known to have remained functionally perfect for several years. If this fabric is proved capable of forming a permanent vascular channel it should be of great help in vascular surgery, particularly in war wounds. Length would be no difficulty, as it is when using homografts, and it might even be possible to replace arteriosclerotic vessels where the disease is of considerable extent.

Mr. W. J. DEMPSTER has already published a number of articles on transplantation of the kidney. It is well known that autotransplants survive indefinitely, but most of the visitors to the farm were unaware that the concentrating power of the kidney depends upon the presence of an intact ureter. Thus a kidney transplanted into the groin with its ureter intact functions normally; a cervical transplant with a nephrostomy secretes a large amount of urine of low specific gravity. Homotransplants cease to function and start to disintegrate after three weeks. Dempster has shown that this is an immunity reaction on the part of the host. When a second kidney from the same donor animal is grafted, after the first kidney has necrosed, it undergoes acute necrosis in 36 hours. This also happens if the recipient has been immunized to the donor's protein by a previous skin graft.

New Machines

A rotor pump was shown with which the circulation of an animal can be maintained while the heart is out of action. The pump delivers oxygenated blood from a donor animal, and controls the exchange of blood so that pooling of the donor's blood in the recipient's capillary bed is avoided.

Dr. A. A. G. LEWIS and Dr. VUK EISEN have been performing experiments which show that the oliguria occurring after operation is due to increased secretion of the antidiuretic hormone of the pituitary.

Mr. P. INGRAM demonstrated the electrogastrograph, an instrument which measures the electrical potentials generated in the stomach wall. It is of great interest to the gastric physiologist but does not have any clinical application at present.

BRITISH DIABETIC ASSOCIATION

ANNUAL SCIENTIFIC MEETING

The annual scientific meeting of the British Diabetic Association was held at University College Hospital Medical School, London, on July 16 and 17. Dr. R. D. LAWRENCE was in the chair for the first session, Professor MAX ROSENHEIM for the second.

Insulin Zinc Suspensions

Dr. K. HALLAS-MØLLER (Copenhagen) delivered the Eighth Banting Memorial Lecture on the chemical and physiological background of the insulin zinc suspensions (I.Z.S.). A few years ago he and his colleagues at the Novo Laboratories began a detailed study of the interaction of zinc and insulin. They found that relatively small quantities of zinc added to insulin in the presence of an acetate buffer produced a stable insulin-zinc complex, which was insoluble at the *p*H of the blood and did not require the addition of protamine or globin. Moreover, two distinct zones occurred during precipitation—crystalline and amorphous—and it is the proportion of these which determines the action of the new suspensions. Thus amorphous is relatively quick-acting (12–16 hours) and is named "semi-lente," while crystalline is slower (30 hours) and is called "ultra-lente." A mixture of three parts amorphous to seven parts crystalline results in "lente" insulin, with an intermediate action.

Dr. Hallas-Møller went on to say that a number of years had been spent in studying the physicochemical factors which affect insulin action, and it was possible that even better insulins may be produced in the future. He ended with some interesting speculations on the role of zinc in the pancreas, and on the possibility of competition between insulin and other substances for zinc being concerned in the causation of diabetes.

Clinical Experience with the New Insulins

The discussion which followed was devoted largely to clinical experience with lente insulin. Dr. Hallas-Møller had already said that more than 80% of diabetics could be stabilized on one daily injection of lente insulin, and this statement was borne out by all subsequent speakers. Dr. W. G. OAKLEY (London) opened with a review of nearly 500 cases treated at King's College Hospital, and described the results as "remarkable," especially in new patients and in children. He and others emphasized the need for increasing the dose by at least 25% when changing over from older preparations, otherwise deterioration and ketosis might occur rapidly.

Dr. J. M. MALINS (Birmingham) said that one should be cautious about any new therapy because of the enthusiasm of doctor and patient, and results with I.Z.S. were difficult to assess since many old cases were transferred because of poor control. However, lente insulin alone was as good as P.Z.I. or a mixture of P.Z.I. and soluble, unless the daily dose exceeded 80 units. Its great advantage was the ease with which it could be handled by junior hospital staff and by general practitioners. A small number of patients complained of difficulty in giving their injections, and this might possibly be due to rapid precipitation of the suspension: patients and district nurses should be warned against delay after drawing up the solution into the syringe.

Dr. G. R. VENNING (Manchester) described the routine use of I.Z.S. for both in-patients and out-patients. Carbohydrate should be evenly distributed, though slightly greater amounts should be taken later in the day. Hypoglycaemia was usually mild and might occur from noon onwards; local and even general sensitivity reactions could arise, even with highly purified preparations. Dr. J. M. STOWERS (Dundee) described a group selected because of poor control. The injection should be given at least an hour before breakfast so as to avoid initial hyperglycaemia, and some carbohydrate should be reserved for the later evening. Although 30–70 units lente insulin was the average, a proportion of patients were well controlled on doses up to 150 units daily. So-called "brittle" diabetics were no better controlled with the new insulins, but all speakers agreed that a number of patients required close individual study, if possible in a centre, where various combinations of I.Z.S. could be tried.

Dr. J. D. N. NABARRO (London) read a paper on the use of fructose in the treatment of diabetic ketosis, and Dr. J. LISTER (Windsor) reported the results of an anthropometric study of 155 diabetics, which confirmed the view that there are two broad groups of patients who suffer from diabetes.

Plasma Insulin Estimations

On July 17 Dr. P. J. RANDLE (Cambridge) and Dr. J. VALLANCE-OWEN (London) described the results of insulin assay, using the uptake of glucose by the rat diaphragm as a measure of insulin activity. Dr. Randle had obtained higher values than any previous worker, and 20 times more plasma activity than Dr. Vallance-Owen; there were, however, certain important differences in technique. Acromegalics showed the highest levels of activity, and animal experiments confirmed that the pituitary played a large part in controlling the substances in the plasma that Dr. Randle was measuring. For these and other reasons he preferred to talk of "insulin-like activity" rather than plasma insulin. Dr. Vallance-Owen could increase plasma insulin by giving glucose to normal subjects, and the highest value was obtained in a patient with an islet-cell adenoma of the pancreas. He could not find any insulin in the plasma of acute diabetics, though normal quantities were present in the obese group. An interesting observation was that insulin added

to the plasma of acute diabetics *in vitro* was without effect in raising the level, which suggests that there is an inhibiting substance present in such plasma.

Dr. F. V. FLYNN (London) reported studies by paper chromatography in two patients with essential pentosuria. Glucose-tolerance tests were normal in spite of a constant excretion of a reducing substance which was identified as the pentose, xylulose. Dr. W. H. H. MERIVALE (London) discussed a preliminary investigation which he had carried out with Dr. R. A. HUNTER into the effects of barbiturates on carbohydrate metabolism. A variety of abnormal glucose-tolerance curves had been obtained, and late hypoglycaemia in the five-hour test was not an uncommon finding.

Finally Dr. JOAN WALKER (Leicester) ended an excellent meeting with a notable account of the "small hard core" of adolescent diabetics with intellectual and environmental difficulties, who so badly need protection and education. It was possible, she said, that diabetes might accentuate an underlying psychopathy, and the problems of the home were magnified for the young diabetic. It was not generally realized that certain patients might give themselves a dose of insulin designed to produce hypoglycaemia, in order to escape from their environment. There was a great need for a centre such as her own Burley-on-the-Hill, soon to be closed, where sympathetic handling and rehabilitation could do much for this social problem.

INTERNATIONAL FEDERATION OF MEDICAL STUDENT ASSOCIATIONS

CLINICAL CONFERENCE IN LONDON

The British Medical Students Association is host and organizer of this year's Students International Clinical Conference now in progress in London. The Conference, which started with a reception on July 14 at B.M.A. House, at which the Chairman of Council of the B.M.A. and Miss Gregg welcomed the delegates, moved to Birmingham on July 21, and on Sunday goes to Edinburgh until the conclusion of its proceedings on Thursday, July 29. The list of 51 delegates contains names of representatives from Belgium, Denmark, Eire, Finland, France, Germany, Great Britain, Holland, Italy, Norway, South Africa, Sweden, Switzerland, and Yugoslavia. An extensive clinical programme has been arranged, made possible by generous co-operation on the part of senior members of the profession in the three centres where the Conference is meeting. The programme includes lectures, demonstrations, and ward rounds covering many subjects. Nor has the social side been neglected, and visiting students should return home with more than a superficial knowledge of this island and its life—medical and otherwise.

The Aims of the Federation

The International Federation of Medical Student Associations was created and its constitution approved by the eight founder countries in December, 1951. The founder countries were Austria, Denmark, Finland, Germany, Great Britain, Holland, Norway, and Sweden. Membership is open to any national medical student organization which agrees to abide by the constitution of the association. The aims of the Federation are defined as: ". . . to study and promote the interests of medical student co-operation on a purely professional plane, and to promote activities in the field of student health and student relief." It is understood that the term "student relief" means "student welfare." The constitution provides for a general representative assembly which meets once a year (usually in connexion with the clinical congress) and an executive board which meets bi-annually. There are four standing committees of the Assembly dealing with finance, medical education, student health, and travel and exchange.

So far the Federation has given practical expression of its aims by organizing clinical conferences—such as the one now in progress—and arranging student exchanges. It is these opportunities for personal contact which sow the seeds for further projects, and the International Federation of Medical Student Associations will indeed fulfil a service to medicine if it develops—as it must—in the doctors of tomorrow the habit of thinking internationally.

The Federation is strictly non-political, as the words "on a purely professional plane" in its aims imply. It has no connexion with the International Union of Students (whose headquarters are in Prague) and, indeed, it was largely the secession of the British Medical Students Association from that body in 1950, because of its political associations, which led to the foundation of the International Federation of Medical Student Associations.

FACULTY OF DENTAL SURGERY

MINISTER AT COLLEGE OF SURGEONS

The seventh anniversary dinner of the Faculty of Dental Surgery of the Royal College of Surgeons was held on July 16 in the College's new Great Hall in Lincoln's Inn Fields, with Professor FRANK C. WILKINSON, the Dean of the Faculty, in the Chair.

After the Loyal Toasts had been drunk, the health of the College was proposed by the Principal of London University, Dr. D. W. LOGAN. With an admonition to the chief guest, the Minister of Health, not to listen, Dr. Logan improved the occasion by urging all independent and self-governing bodies to hang together. If they did not, in these days of increasing State intervention, they would assuredly "hang separately." He congratulated the College on its stand against fragmentation: the development of Faculties of Anaesthetists and Dental Surgery within the College had brought a new unity, and rumour had it that more Faculties were to come. The creation of the Institute of Basic Medical Sciences was another example of integration. It was a joint enterprise of the College and the University, and he hoped it would prove worthy of both its natural and adoptive parents. Dr. Logan concluded with a warm tribute to Sir Cecil Wakeley, and a welcome to his successor as President of the College, Sir HARRY PLATT. The latter replied to the toast, and said it was their hope that the new College would become the Mecca of the younger surgeon, particularly those from the Commonwealth. Arrangements for post-graduate teaching were being extended outside the teaching hospitals, and he foresaw a period of great expansion in the College's activities—and in its budget. In the past the College had been within the City of London, and he was sure, making here a graceful acknowledgment to the presence on his right of the Lord Mayor of London, Sir Noel Bowater, that as in the past they would not look to the City in vain for help.

The Minister of Health, Mr. IAIN MACLEOD, in proposing "The Faculty," quickly dispelled any idea that he might make a major political announcement: dinner was not the time for that. Instead, he mentioned with pleasure the increasing friendliness over the past year between himself and the Ministry on the one hand and the dental profession on the other. Now that many of the early problems of the Health Service had been solved, he hoped a longer view could be taken. It was time to give the N.H.S. a slant towards the preventive and away from the curative.

Shortage of Hospital Dental Departments

Replying to the toast, the DEAN OF THE FACULTY was not deterred by the Minister's precept from diagnosing the current ills of his profession. First was lack of recruits, and he appealed to the dentists themselves to help remedy the situation. "The best propaganda for any profession is the men in it." Then there was a shortage of consultant appoint-

ments when compared with those qualified to fill them. Regional boards had been slow to set up dental departments. They were restricted by their budgets. The same spirit needed injecting into the hospital dental service as, thanks to the University Grants Committee and the Nuffield Foundation, had raised the teaching of dentistry from the position of Cinderella in the universities. More money should be spent centrally on dental departments in hospitals. Professor Wilkinson appealed for co-ordinated effort to solve these problems. Finally he had a word to say about the Department of Dental Research which was to be established in the College. On Sir Wilfred Fish had been laid the task of collecting funds for it, and he hoped that contributions would be generous. Sir WILFRED FISH also had the task of proposing the health of the large number of distinguished guests at the dinner, and this he did with his customary charm. Sir THOMAS WHITE, the High Commissioner for Australia, replied.

Reports of Societies

LOCAL MEDICAL SOCIETIES

London County Medical Society

A meeting of the London County Medical Society was held at the Spinal Injuries Unit, Stoke Mandeville Hospital, Aylesbury, on June 26, by kind permission of the director, Dr. L. Guttmann. Thirty members and guests attended.

Dr. GUTTMANN reviewed the history of spinal injuries and the problem of the spinal paraplegic. Until ten years ago these cases were regarded as hopeless and a burden to society. After a variable period of increasing inanition and acute misery from bedsores and urinary infection, death came as a merciful release from further suffering. Since then the work done in the unit had shown that such a fate was completely unnecessary. By the intelligent application of physiological principles no case of spinal injury, whether traumatic or infective in origin, even with complete transection of the cord, need be in hospital longer than six or seven months, and, moreover, such patients could be restored as useful members of society trained to carry out an efficient job. Full success could be assured provided the following principles were observed from the start.

First, bedsores should never occur. As a result of spinal shock there was vasodilatation in the affected area for a variable period after injury, and all the normal sensory perception of discomfort was in abeyance. During that time pressure on the affected area must be avoided. This was done by laying the patient on ordinary or sorbo pillows and turning him from one side to the other every two hours *night and day*. It required four trained orderlies to move the patient efficiently. Dr. Guttmann stressed that the two-hourly movement throughout the night should not on any account be omitted.

Secondly, the bladder must not be allowed to become infected. During the first fortnight it might be possible to ensure emptying of the bladder by massaging it in a Credé fashion with one hand above the pubes and a finger in the rectum. Should this fail, intermittent urethral catheterization might be needed. If so, it must be carried out with full sterile precautions, as for a major operation, and a non-touch technique adopted throughout. The use of the indwelling catheter was deprecated. If infection had already occurred the causal organism should be assessed in terms of its antibiotic sensitivity and the appropriate drug used. Morphine was used only after operation, and Dr. Guttmann strongly decried the use of barbiturates and sedative drugs.

Society of Physicians in Wales

The fifth meeting of the Society of Physicians in Wales was held at Tintern on June 11 and 12, under the chairmanship of Dr. E. GRAHAME JONES. The principal discussion was on haematemesis. Dr. ERNEST EVANS opened by presenting the medical aspects, and he was followed by Mr. IVOR LEWIS on the surgical aspects, Dr. BRYAN WILLIAMS on the radiology of the condition, and Dr. G. S. ANDREWS and Dr. W. JONES WILLIAMS on the pathology. Other papers read at the meeting were: "The Clinical Value of Faecal Blood Tests" (Dr. ANEURIN HUGHES), "Butazolidin in Rheumatoid Arthritis" (Dr. KENNETH LLOYD), "Neurological Syndromes Accompanying Developmental Anomalies of the Base of the Skull and the Cervical Spine" (Dr. J. D. SPILLANE), "Phonocardiography, with Special Reference to Mitral Valve Disease" (Dr. A. J. THOMAS), and "The Value of Strict Dieting, Drugs, and Robaden in the Treatment of Peptic Ulceration" (Dr. P. R. C. EVANS).

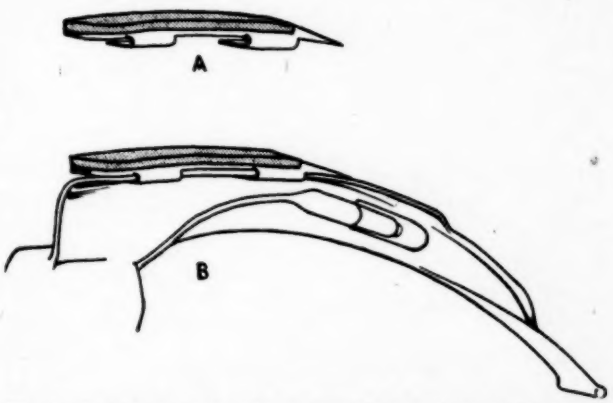
Hong Kong Society of Anaesthetists

The inaugural meeting of the newly formed Hong Kong Society of Anaesthetists took place on June 17. About 25 practitioners attended. The hon. secretary is Y. K. Poon, Department of Surgery, University of Hong Kong.

Preparations and Appliances

RUBBER TOOTH-PROTECTOR FOR ATTACHMENT TO THE MACINTOSH LARYNGOSCOPE BLADE

Dr. F. F. WADDY, senior consultant anaesthetist, Northampton General Hospital, writes: Some teeth, especially those with irregular and friable edges, are bound to suffer even when a laryngoscope is placed most gently against them. If one looks at the blade of a well-used laryngoscope there are innumerable scratches which bear witness to encounters from which the laryngoscope has happily been the sufferer. However, the minute chips off friable teeth go unrecorded.



The tooth protector: A, alone; B, affixed to blade of Macintosh laryngoscope.

Some time ago my anaesthetic theatre technician, Mr. H. Lines, suggested clipping a rubber device on to the blade. The means of so doing was developed by my technician, Mr. R. Miller, and I have been using an attachment made by him for well over twelve months. Professor R. R. Macintosh has seen this and suggested an improvement on our original pattern. He also asked his artist, Miss Becke, to make the accompanying drawing for me. With ordinary care the protector should not be dislodged and fall into the patient's mouth, but if this should happen it can readily be picked out with Paterson or Magill forceps.

The Longworth Scientific Instrument Co., of Abingdon, Berks, are making a few for sale, and I gratefully acknowledge the help of the four persons mentioned in developing and illustrating this very necessary dental safeguard.

Correspondence

Smoking and Cancer

SIR,—Dr. Roy F. Fairweather and Dr. Geoffrey E. Loxton (*Journal*, July 10, pp. 100 and 101) have raised two questions regarding the data presented in our article on "The Mortality of Doctors in Relation to Their Smoking Habits" (*Journal*, June 26, p. 1451).

The first question is a purely statistical one—that is, is it possible to have a "statistically significant" answer when there are no deaths from lung cancer observed among non-smokers and 3.8 deaths were expected, and yet, on the other hand, a "not significant" answer when as many as 15 deaths from cancer at other sites were observed and 10.1 were expected? The answer is, Yes. The actual probabilities of such differences (or more extreme ones) turning up by chance are, in the first case, 1 in 45 and, in the second case, 1 in 11. The first probability is customarily accepted as sufficiently small to justify the conclusion that the observed difference is unlikely to be due to chance; the second is not. The explanation of the apparent paradox, that a small difference may be more significant than a larger one, is that in such a test one is concerned more with the *relative* than with the *absolute* size of the difference—that is, the difference relative to the expected number. The principle may be appreciated more readily if we consider a more extreme case, which needs no calculus of probabilities. No one, we think, would question the significance of observing no persons at all dying of a disease when 20 were expected to do so. The difference of 20 stands out sharply. But one would not be particularly surprised to observe that 970 persons had died when 1,000 was the expected number. The difference of 30 is relatively slight and unimportant. In short, therefore, non-smokers in our data had a "statistically significant" absence of deaths from cancer of the lung and no "statistically significant" excess of cancer of other sites.

The second, and much more important, question is whether our results indicate that smoking might determine the site at which cancer develops, but at the same time have no effect on the total mortality from cancer of all sites. The data in this particular report are compatible with that hypothesis in that there are no significant differences between the death rates from cancer at all sites among the different categories of smokers. We do not, however, think that the hypothesis provides at all a likely explanation of the facts, for the following reasons.

First, the mortality from cancer of sites other than the lung does not decline with the amount smoked—as it should do, on this hypothesis, to compensate for the steady increase observed in mortality from lung cancer. Secondly, the suggested explanation is based wholly upon a single (and preliminary) paper and is not in accord with the mass of relevant data already published by other workers as well as ourselves. That evidence has shown an unambiguously positive association between lung cancer and cigarette-smoking (for references see *Journal*, June 26, p. 1451), and it has suggested the possibility of some other positive associations—for example, between cigarette-smoking and cancer of the larynx and between pipe-smoking and cancer of the lip; it has shown no negative associations at all between smoking and the other types of cancer investigated.[1,2]

Similarly, our own data on the smoking habits of patients with other forms of cancer (mainly with cancer of the stomach or of the large bowel) do not conform with the hypothesis.[3,4] We can briefly summarize them in the accompanying figures, which compare the smoking habits of men aged 45–74 with non-respiratory cancer with those of men of the same age group with other non-respiratory diseases.

Disease Group	% of Non-smokers	% Smoking Daily Average of				No. of Men Interviewed
		<5 g.	5 g.–	15 g.–	25 g.+	
Non-respiratory cancer ..	4·6	9·4	47·2	26·0	12·8	473
Other non-respiratory diseases ..	5·6	9·0	44·8	26·9	13·7	875

The two sets of figures are remarkably alike and reveal no excess of non-smokers or of light smokers in the cancer group.

It is hazardous, we submit, to attempt to draw any new or definite conclusion from the present report alone. In presenting these preliminary data on the deaths of doctors we were ourselves careful to link the conclusions we reached to our previous large-scale inquiries into patients. The results of the two inquiries, retrospective and prospective, are remarkably consistent in the association between smoking and cancer of the lung.—We are, etc,

RICHARD DOLL.
A. BRADFORD HILL.

London, W.C.1.

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Warmth in the Treatment of Shock

SIR,—The scientific meetings at the Annual Meetings are always stimulating, but "discussion" afterwards is often limited to asking questions—which do not develop the issues involved and so all too often receive somewhat partial answers which evade the questioner's problem. As this happened to a question of mine at Glasgow on the use of warmth in the treatment of shock in coronary thrombosis, may I be allowed to put it at greater length, particularly as its propounding seemed to create considerable interest, while the reply which dismissed it as "abstruse" suggested that it has not received the attention it deserves?

Though my question has applications to the treatment of shock in general, where the pumping mechanism is intact, it has special importance in coronary disease where the heart is suddenly and severely damaged. Briefly, my thesis is that shock may be a preventive mechanism to save or prolong life in the following ways: (1) By vasoconstriction of the peripheral vessels it seeks to maintain the circulation in the vital inner organs. (2) The cold sweat which occurs diminishes the blood volume and so prevents the vasoconstriction unduly increasing the strain on the heart. (3) The cooling of the body which ensues diminishes metabolism and so the need for oxygen. (4) Shock, in brief, seems to be an attempt by the body in a condition of stress to obtain rapidly the advantages which have been shown to be attainable by hypothermia. Incidentally, this cooling, by limiting the multiplication rate of bacteria, should tend to limit and not increase the danger of pneumonia, etc. The application or even the too-careful conservation of warmth might therefore have a bad instead of a good effect by dilating the blood vessels and so causing a drop in blood pressure, leading to pulmonary complications. By increasing the demands for oxygen it increases the work of the heart, and so leads to further heart failure, and by raising the temperature it favours pulmonary infection.

The points I raised are thus not abstruse but in fact very obvious and practical, though they are often overlooked. The three points I mention—sweating, cooling, and diminution of tissue metabolism—are, curiously enough, also the visceral effects of morphine, and, as I have pointed out,[1] probably have much to do with its often unexpected life-saving properties. I also recently questioned (*Journal*, January 2, p. 44) the wisdom of applying warmth after its administration. As I said at Glasgow, the use of warmth in shock is traditional; the question is: is it rational? Just as we used to keep limbs warm when threatened by gangrene, and now know that by doing so we were increasing the very danger we sought to avoid, are we doing the same thing when we treat shock by warmth until we have rehabilitated the heart or, if due to haemorrhage, replaced the fluid lost so that adequate circulation for the whole body can be maintained?

Few people believe more than I do that prompt treatment of symptoms may often avert serious trouble, but in the case of shock it does appear that traditional treatment, which is largely the treatment of symptoms, may be the very worst thing we can do, though I may seem foolhardy to suggest it.—I am, etc.,

Winsford, Cheshire. W. N. LEAK.

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Harmful Certification

SIR,—Oliver Wendell Holmes tells us how necessary it is at times to temper absolute truth "by the exigencies of human frailty, which cannot always bear the truth in health, still more in disease." "A physician," he wrote, "must sometimes conceal and sometimes disguise a truth which it would be perilous or fatal to speak out."[1]

Have we completely lost sight of such therapeutic kindness by issuing certificates to patients, baldly stating diagnoses which were better kept from them? Especially does this apply to a disease such as disseminated sclerosis. I quote from a recently published textbook of medicine[2]: ". . . diagnosis should never be disclosed to the patient because disseminated sclerosis is a term with which the public is now familiar and the sufferer, if not already aware of his gloomy future, is likely to confirm it by reference to medical text-books."

I was disturbed this morning to read in a letter from a friend with this disease, recently seen by a neurological colleague who had impressed on his patient's relatives and written to the local practitioner that the diagnosis should not be made aware to him, that he had received a certificate from his doctor stating that he was away from work because of disseminated sclerosis. I grieve to think of the effect on this young man, who is of the attractive, invariably polite, quiet, but introspective type so typical of sufferers from this dire but unpredictable disease. After every care had been taken with his relatives and friends to protect him from knowing the diagnosis, this blatant certification, one fears, can but affect him adversely. In this case the harm has already been done, but in the interests of other sufferers cannot some action be taken to avoid repetition in the future?—I am, etc.,

Cardiff. LAMBERT ROGERS.

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General Practice in America and Great Britain

SIR,—Anyone who has studied the matter will agree with Dr. S. C. Dyke (*Journal*, July 3, p. 45) that the position of the general practitioner in England and Wales in respect of laboratory investigations is at least as good as for practitioners in the U.S.A. I have not visited America but have had very many medical visitors come to see what we do provide under the N.H.S., and all have been astonished at the service given. But Dr. Dyke is a little too sanguine in thinking that there is "now no part of England and Wales in which these facilities are not readily available to the G.P." On paper that is so: but some regions lag very much behind others, as a glance at the annual hospital statistics will show. In one region not a single domiciliary visit by a pathologist was recorded. Many pathologists have not been able, for lack of staff and space, to give the service they would like to give. Regrettably, there are even areas in which the pathologists have made no attempt to provide all that general practitioners need. You reported recently (*Journal*, May 1, p. 1045) an inquest on a patient who died from haemorrhage in Kensington after an anticoagulant, in which evidence was given that prothrombin times could not be done in the patient's home. Yet there were at least 25 pathologists within half a mile of the patient's home—and some at quite large units.

There is, however, one error in Dr. Dyke's letter suggesting almost as much "lack of familiarity" with the N.H.S. as he accuses Dr. C. M. Fleming of showing. Full domiciliary visits in all specialties are available from whole-time as well as part-time consultants. In pathology practically all domiciliary visits are made by whole-time consultants, and it is to them that the G.P. in almost every area looks for his laboratory assistance. This is indeed one of the strongest reasons for removing the present differential in incomes as between whole-time and part-time officers. In my group the G.P. can obtain any laboratory assistance he wants, but always from a whole-time officer. So far as Scotland is concerned Dr. Dyke might have gone a little further. The appointment of many group pathologists on a whole-time basis is urgently needed there, for the G.P. has so long been without an "open door" that he will accept it only from men who give that service as part of their ordinary duties and not as something "extra"—of which the Scottish practitioner is rightly suspicious. There is a tendency, I have found, for Scottish G.P.s to regard laboratory investigation as purely a hospital function, and they do not demand, and certainly do not get, the assistance, so important to good general practice, which their colleagues get in England.—I am, etc.,

Kingston-on-Thames, Surrey. D. STARK MURRAY.

Report on General Practice

SIR,—Many of us will read your leading article under this heading (*Journal*, July 3, p. 34) and note with gladness that the family doctor is following the next natural step in the steady evolution of general practice in Britain—namely, increasing partnership. I hope, however, that the majority of the profession will regard rather in the light of current jargon your closing allusion to general practice, ". . . this important branch of Medicine," and will still think of it as the root and trunk of medicine.—I am, etc.,

Clifton, Bristol, 8. A. WILFRID ADAMS.

Meckel's Diverticulum Causing Obstruction in the First Week of Life

SIR,—May I be allowed to add a note to Mr. Erik Christensen's paper on Meckel's diverticulum (*Journal*, June 12, p. 1347)? My patient with obstruction of the small bowel is at the other end of life to his, who was 79 years' old.

On April 21 this year a boy aged 3 days was admitted to hospital with bilious vomiting. He had passed meconium in large amounts. He was jaundiced but not markedly so, and his abdomen was mildly distended. There was no fever. His pulse rate was 140 per minute with respirations at 30. *X*-ray examination in various postures on the day of admission showed distension of the small bowel but no fluid levels. A later film was more than difficult to read and seemed to show multiple strictures in the small bowel with many fluid levels. On April 23 bilious vomiting became much more serious and at exploration I found dilated purple small bowel with a small amount of clear bilious ascitic fluid. A Meckel's diverticulum, 1½ in. (3.8 cm.) long, was adherent to the neighbouring mesentery forming an obstructing band. At its base was a tiny perforation firmly sealed with coagulated lymph. Three inches (7.6 cm.) of the small bowel with the diverticulum was resected and the ends joined. The baby recovered quickly and was returned to the care of his mother 18 days after the operation. He weighed 7 lb. (3.2 kg.) at birth, 6 lb. 6 oz. (2.9 kg.) on admission to hospital, and 8 lb. 2 oz. (3.7 kg.) 39 days after birth.—I am, etc.,

Harrogate. T. VIBERT PEARCE.

Varicocele and Male Subfertility

SIR,—Dr. J. K. Russell's excellent article (*Journal*, May 29, p. 1231) shows a significant association between varicocele and subfertility, but does not show that either condition causes the other. Dr. H. A. Davidson maintained the theory that the varicocele acts as a radiator at blood heat (*Journal*, June 12, p. 1378) and so depresses spermatogenesis

by raising the temperature of the scrotum. As the blood in the varicocele is returning to the abdomen from the scrotum it might be expected to be at scrotal temperature, in which case it cannot warm scrotal contents. On the other hand, overheated rooms, excessive clothing, debility, and fatigue are known to produce relaxation of the tunica dartos and cremaster muscle, and also to affect fertility. The remedy would appear to be better hygiene, with occasional cold baths or local cold sponging.

Dr. Davidson proposes to complete a series of 50 varicocele excisions for subfertility this year, and quotes Dr. J. K. Russell as saying that a unilateral varicocele may depress spermatogenesis in both testicles. In actual fact Dr. Russell said it was difficult to explain why this sequence should occur. I suggest that it does not occur and that surgical removal of the pampiniform plexus could be expected to terminate any spermatogenesis that existed "in the ipse-lateral" testis, to coin a phrase. This is clearly a question requiring very serious consideration, and I submit that in the state of current knowledge varicocele excision for subfertility is unjustifiable.—I am, etc.,

Shipley, Yorks. H. S. RUSSELL.

Prevention of Congenital Syphilis

SIR,—In so capable a contribution as Dr. R. S. Morton's (*Journal*, June 26, p. 1470) on the prevention of congenital syphilis the omission of any reference to false positive serological reactions is surprising. Until the possibility of these non-treponemal reactions is controlled by *Treponema pallidum* immobilization tests, the husband's W.R., and finally the mother's serological reactions post-partum, when the disturbances in cholesterol and globulin metabolism have subsided, it is not justified to say the diagnosis is beyond reasonable doubt.—I am, etc.,

Dublin. JOSEPH BARNES.

Treatment of Status Asthmaticus with Nitrogen Mustard

SIR,—I have read with great interest the medical memorandum by Dr. B. P. Arya (*Journal*, June 26, p. 1475). The method by which the white blood cell count is done seems to be rather unusual. The universally adopted Neubauer's chamber always gives the results of the white cell count in figures ending either with 50 or 00. In both the counts mentioned in the note the figures seem rather unusual. Regarding the vomiting, in the beginning Dr. Arya mentions that it helped the expectoration by liquefying the tenacious secretion. However, in the second and further treatments, the attempt was made to prevent the vomiting by giving phenobarbitone. These two procedures appear contradictory. In the addendum, there is no mention in the further cases about the vomiting. Having read this note one is left wondering about the white cell count, whether the vomiting is a desirable side-action in the treatment of status asthmaticus, whether it is to be prevented, and, if so, when. I shall be thankful for further enlightenment.—I am, etc.,

Bombay. D. D. VORA.

Post-mortem Technique for the Occasional Performer

SIR,—In his article on post-mortem technique (*Journal*, July 3, p. 38) Dr. T. V. Cooper emphasizes "a small point of technique which increases safety" when cutting kidneys, and he adds, "To cut towards the palm of the hand, as some books show, is in my view dangerous." I concur with him in this view and I would like to bring to the notice of your readers a wooden block designed for use when bisecting kidneys which I described in this journal (*British Medical Journal*, 1952, 2, 1045). The block is easy to make, and with it kidneys can be bisected efficiently and with absolute safety.—I am, etc.,

Bradford, Yorks. R. A. MCINROY.

Angular Stomatitis and Artificial Dentures

SIR,—In his article on angular stomatitis and its association with artificial dentures (*Journal*, June 19, p. 1415) Dr. J. G. Harkness has raised some points which require further comment. It is difficult to understand why he should claim that "apparently, because it prevents discomfort when dentures are fitted, it is standard dental practice to close a patient's normal bite," since on the contrary it is essential to ensure that artificial dentures provide the correct functional vertical dimension (or "height of the bite") when centric maxillo-mandibular relation is recorded. In certain difficult cases this functional vertical dimension may be deliberately reduced, but such cases represent only a very small proportion of those patients for whom full artificial dentures are constructed, and, even so, in no case would overclosure gross enough to cause angular stomatitis be the result. Perhaps Dr. Harkness has been confused by the fact that it is essential to provide a freeway space when the functional vertical dimension is established. The concept of the rest position of the mandible, and the freeway space, was recognized by Bennett,[1] restated by Niswonger,[2] and developed and expounded by Thompson.[3] Briefly, it may be stated that in a given posture there is a constant rest position of the mandible, where it is suspended in space by the reciprocal co-ordination of its elevators and depressors. In this position the natural teeth are separated by a freeway space, which averages about 2–3 mm. when measured at the front of the mouth. It is difficult to measure this separation accurately by normal methods, and when providing full artificial dentures it is suffieient to ensure that a freeway space exists, of at least adequate dimensions.

When the natural teeth are lost, and full artificial dentures provided, there is a progressive resorption of the alveolar ridges, which, together with attrition of the occlusal surfaces of the artificial teeth, causes a progressive diminution in the functional vertical dimension established by the dentures; for this reason full artificial dentures should be corrected by relining, rebasing, or complete reconstruction at regular intervals. It is only when an abnormally large freeway space exists, either because of extended wearing of full dentures or because of bad dentistry when the dentures were constructed, that malocclusion can be considered as a cause of angular stomatitis in the edentulous subject, by causing puckering of the corners of the mouth, accentuated angular creases, and retention of the saliva there, each time the mandible closes to tooth contact. In such cases, the correct treatment consists of rebuilding the dentures, increasing the functional vertical dimension in the process to a point where only a normal freeway space remains between the teeth when the mandible is in the rest position. Dr. Harkness's treatment, of increasing the vertical dimension in such cases by an arbitrary amount, without any reference to the rest position of the mandible or any attempt to provide a normal freeway space, is reminiscent of the irrational and often unjustified "bite-opening" or "bite-raising" which was fashionable some twenty years ago, and it cannot be too strongly condemned. It is not surprising that he found that "in many cases this proved impracticable, mainly because of resultant discomfort in the nature of temporo-mandibular joint arthritis." It must be pointed out that if in his arbitrary "bite-opening" the freeway space normal to the individual is reduced or obliterated, and if the patient can tolerate this state of affairs, alveolar reabsorption will proceed at a rapid rate, with consequent detriment to the denture-bearing areas of the patient's mouth, until a normal freeway space is restored. This will occur whenever the freeway space is encroached upon, regardless of whether the "bite-opening" has been done in one or several stages.

As far as sensitization by residual monomer in denture base material is concerned, it has been shown that residual monomer can exist in a denture base as a result of incomplete cure. It can be detected fairly easily, since it affects various physical and mechanical properties of the material,[4 5 6 7 8] but in general it has been found more satisfactory to use chemical procedures which are more specific for residual monomer. A sensitive qualitative test and a quantitative test have been developed,[9] and results have shown that all residual monomer is not water-extractable, and that water-extractable monomer exists only when the denture base has been undercured. When the normal dental curing cycles are employed, of (*a*) eight hours at 72° C. or (*b*) 1.5 hours to reach 100° C., followed by boiling for one hour, no water-extractable

residual monomer exists after four hours in cure (*a*) or after 1.75 hours in cure (*b*). If water-extractable monomer is present in an undercured denture base, it is leached out fairly rapidly, and has disappeared after 17 hours in water at 37° C. However, Dr. Harkness is incorrect in stating that the rate of polymerization of methyl methacrylate is "appreciable" at room temperature; on the contrary, monomeric methyl methacrylate, to which the initiator benzoyl peroxide (the "organic peroxide or some such substance" referred to by Dr. Harkness) has been added, may be left at room temperature for several weeks without polymerizing appreciably. The hardening of uncured dough in a few days, remarked on by Dr. Harkness, is due merely to evaporation of monomer from the mix. Hence if water extractable residual monomer is present in an undercured denture base, it is reasonable to assume that it will remain there until it is leached out, either when the denture is placed in the patient's mouth or when it is immersed in water. It is interesting to see that Dr. Harkness employed a vacuum method of extracting residual monomer, although, as he seems to have carried out determinations on only one sample of each cure employed, the results presented in Table II of his article cannot be regarded as very significant. Failing information to the contrary, it must be assumed that the vacuum extraction was carried out at room temperature, although Grassie[10] found that high vacuum treatment of polymethyl methacrylate requires that the softening temperature of the polymer should be reached before volatiles in the interior of the polymer are released.

Investigations on the toxicity of methyl methacrylate[11 12] have shown it to be slightly more toxic than acetone. No cumulative effect was observed,[11] although a mild human sensitization reaction was produced. No irritation by clear or pigmented polymer was observed.[12] Only two cases showing features of sensitivity have been recorded[13 14] and one of dermatitis of the hands.[15] Nyquist[16] was unable to find any irritation by denture base components. It is therefore surprising that in a series of 46 patients Dr. Harkness should be able to make a positive diagnosis of sensitivity to denture base material in 17 cases, especially since in 15 of these cases there was a delay of at least five years, and in 11 of them a delay of more than 10 years, before the appearance of the symptoms. In 14 cases there were mucosal lesions; it is a matter of experience that many patients exhibiting such lesions under artificial dentures are found to have a poor standard of oral hygiene, and that disinfection of the dentures and improvement in oral hygiene will result in improvement of the condition. It may be significant that of the 14 patients, 11 were wearing vulcanite, and only three acrylic, dentures; for the incidence of "denture sore mouth" was much higher when vulcanite was in common use as a denture base, and this is usually accepted as due to the fact that vulcanite, being more porous in nature, was more difficult to keep clean than are the acrylic resins.

It would be interesting to learn whether Dr. Harkness had considered the possibility that the positive reactions observed under patch tests of material from the suspected dentures were in fact due to the infective nature of the scrapings applied to the skin, and to learn whether in his control series of 20 medical students the patch tests were carried out using material from dentures which had already given a positive reaction, or using scrapings from some other source. The fact that Dr. Harkness, by providing new dentures, was able to effect at least an improvement in all but one of the 14 cases of angular stomatitis which he diagnosed as due solely to sensitization to denture base material, does not preclude the possibility that the original lesions may have been due to the protracted wearing of old and unhygienic dentures.—We are, etc.,

R. EARNSHAW.
D. C. SMITH.

Manchester.

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Chromobacterium Prodigiosum

SIR,—A few days before reading Dr. Raymond Greene's letter (*Journal*, June 19, p. 1441) we saw a medical student who was "sweating blood" uninfluenced by the priesthood, crooked or otherwise, or even by the Conjoint Board. From this patient suffering from trichonocardiosis axillaris rubra (lepothrix) we isolated a pigmented micrococcus similar to that described by Castellani in 1911,[1] and later named *Micrococcus castellani* by Chalmers and O'Farrell.[2] It would appear that this type of organism, associated with a nocardia, is more often found in red lepothrix than a chromobacterium, which we have not seen described elsewhere as causative in this condition.—We are, etc.,

M. E. A. POWELL.
DENIS SHARVILL.

London, S.E.5.

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Blood Changes Associated with Disseminated Tuberculosis

SIR,—We have been interested in the paper by Dr. James R. Fountain (*Journal*, July 10, p. 76) on the above subject, and would like to report a case showing similar haematological involvement without miliary spread.

A male, aged 53, admitted to hospital on December 15, 1950, with a two months' history of feeling "off colour," stated that he had rapidly lost about 28 lb. (12.7 kg.) in weight. His main reason for reporting to his doctor was increasing breathlessness and swelling of ankles. There was no history of previous illness. On admission, marked pallor was noted, and on examination the only physical finding was that of dullness of right side of chest. *Investigations: X*-ray of chest.—"Chronic inflammatory edges of right lung with cavity in the right upper lobe probably of tuberculous origin." Blood count, February 16, 1950.—Hb : 19% (3.2 g.), R.C.C. 740,000 ; W.C.C. 1,200. Differential white count.—Polymorphs 41%, lymphocytes 52%, monocytes 1%, plasma cells 6%. Total proteins.—6.8 g./100 ml., albumin 3.6, globulin 3.2. Marrow puncture performed in three sites was very acellular and suggestive of aplastic anaemia. Sputum.—No tubercle bacilli recovered.

In spite of transfusions his condition deteriorated and he died on January 12, 1951. Summary of post-mortem examination.—A grossly emaciated male subject. Lungs showed a large cavity at right upper lobe and multiple small cavities throughout rest of right lung; the left lower lobe was the seat of pneumonic consolidation. No gross pathology was found in the other organs. Sections taken from lung showed the features of fibrocaseous tuberculosis. No tubercles were found in the aplastic marrow.

The point of interest in this case, in comparison with those of Dr. R. Fountain's, is that here we had a profound depression of bone marrow causing a severe aplastic anaemia in a case of acute caseating tuberculosis without miliary spread. We had another case, however, in this hospital of a male, aged 73, with acute miliary tuberculosis showing tubercles in liver, spleen, prostate gland, lymph glands, and lungs, with no evidence of haematological changes in life.—We are, etc.,

JANE M. FULLERTON.
A. G. C. COX.

London, S.E.16.

International Anatomical Nomenclature

SIR,—Two years ago (*Journal*, July 5, 1952, p. 41) you were good enough to publish an account of the first meeting of the representatives of the International Anatomical Nomenclature Committee, and I am now able to communicate to you a summary of the proceedings of the second meeting of the same committee, which met in London at the beginning of June this year.

The subcommittees, which had been entrusted with the revision of the *Basle Nomina Anatomica* (1895) in the light of the findings of the 1952 meeting, had all submitted their reports by December 31, 1953, so that it was possible for these to be collated and circulated to the members of the committee six weeks prior to their recent meeting. On this occasion a representative of the Japanese anatomists, who

had been kept informed of the work of revision, attended and was able to put forward their views. The meetings occupied ten sessions, and at their conclusion a final list of anatomical terms was unanimously approved for submission to the International Congress of Anatomists to be held in Paris in July, 1955. The unanimity of the Congress was again, as in 1952, a matter for congratulation, for it came at the end of ten sessions of continuous discussion in which it was very satisfactory to note that, when the need arose, all the members of the committee were willing to accept the majority view. Indeed, it became clear at each session that willingness to compromise was part of a general spirit of co-operation and that this attitude of "sweet reasonableness" influenced the outlook of all the members of this international committee.

The final list, which is in Latin, will now be printed, and it will be circulated, with an introduction and an appendix, both of which will be printed in French, German, and English, to all the members of the International Congress of Anatomists; it is hoped, in time, to give them an opportunity to examine what is proposed before the Congress meets in Paris on July 25, 1955.—I am, etc.,

Guy's Hospital, London, S.E.1. T. B. JOHNSTON.

Vomiting During Anaesthesia for Forceps Delivery

SIR,—Dr. R. B. Parker's excellent article (*Journal*, July 10, p. 65) is most opportune. Quite recently I anaesthetized a young woman for low forceps. During induction with cyclopropane she had an unexpected and profuse vomit—peas and all. How I wanted to snatch those forceps and deliver the patient in the "left lateral." The abandonment of the "left lateral" is surely the main cause of danger from inhalation of vomit.—I am, etc.,

Blackpool. J. MCAULEY.

Prophylactic Penicillin for Minor Casualties

SIR,—I am in agreement with Dr. G. C. Milner's views (*Journal*, July 3, p. 46) on prophylactic penicillin. I consider it a misuse of this drug and, as is often the case, of the more expensive chemotherapeutic agents combating non-existent infection in minor injuries. As one who has done a considerable amount of casualty work during the past two years, I find it surprising that so few wounds become infected despite the frequent lack of aseptic technique, and even when they do they seldom need the assistance of antibiotics.

However, in support of my casualty colleagues, I wonder whether misuse of these agents is wholly confined to them, and that perhaps some general practitioners are equally guilty. One sees many cases in the casualty department of people who have had extensive courses of penicillin, sometimes for two weeks or more, for abscesses that could have been treated far more successfully by a simple surgical procedure, and saved the patient a lot of pain and trouble. This I have noted especially in the breast, when the patient presents herself with half or more of the breast tissue destroyed as a result of the conviction of a doctor that penicillin has obviated the necessity for incision.

Dr. Milner finds it astonishing that a patient should be asked to return 2½ miles (4 km.) to hospital to have sutures removed, so that no doubt he will find it just as astonishing to learn that I have seen numerous patients sent even greater distances from their own doctors to have wounds, requiring no more than one or two sutures, treated at hospital.

This sending of minor ailments to hospital when they should lie within the scope of the patient's own doctor is, I feel, attributable to faulty medical education. As a student one attempts to learn a lot of high-powered medicine and surgery, whilst the treatment of common everyday illnesses is neglected. Presumably in most hospitals, but not in all, the house-surgeons will have some duties in casualty, but these are chiefly in the evening when he is left to his own devices not to learn by his mistakes but at the patient's expense, for he will rarely see the patient again. I feel that it would benefit all newly qualified persons, and also lead to a better understanding between general practitioners and casualty departments, if, in addition to medical and surgical jobs, they were required to spend, say, three months doing full-time casualty under the guidance of a more senior person. Probably this suggestion will lead to a lot of unrighteous indignation.—I am, etc.,

Manchester, 20. R. F. BOLAM.

Treatment of Interstitial Keratitis

SIR,—I have read with interest Dr. D. P. North's article (*Journal*, July 3, p. 7) of eight cases of interstitial keratitis. This is very rare, for, on careful inquiry, many admit that interstitial keratitis may be one (though never the only) manifestation of congenital syphilis and that treatment of the systemic disease is of paramount importance. The assistance of the ophthalmic surgeon is essential especially for local treatment and to guide us as to the intensity of anti-syphilitic treatment required. In our experience at the London Lock Hospital and at Queen Mary's Hospital, Carshalton, over many years, treatment of congenital syphilitics who have eye symptoms is inadequate with only penicillin and bismuth therapy. Intravenous arsenic therapy in small doses—for example, 0.15 g. N.A.B.—on alternate days clears up the keratitis rapidly, accompanied by routine atropine to the eyes. Admission to hospital for the acute cases who have photophobia, severe headache, etc., is advisable. These symptoms yield rapidly once arsenical therapy is begun. It is wise to continue treatment after the eyes appear to be clear in order to avoid a subsequent attack. Such attacks (in the inadequately treated patient) are especially prone to recur at times of increased stress and strain (such as when working for an examination).

Those of us who have followed up our cases of congenital syphilis from infancy through adolescence to adult life know how capricious is the disease, but at least patients who have received arseno-therapy are less likely to experience recurrence of interstitial keratitis. Dr. North mentions that the eight cases he describes were chosen because they had had no previous attacks of interstitial keratitis before adult life. This is very rare, for, on careful inquiry, many admit that during school years (10–12 years for boys and 8–10 for girls) they had had a short period of time when their eyes were rather sore and they experienced difficulty in reading the writing on the blackboard in class. These initial symptoms were obviously insufficient to require medical advice, and so congenital syphilis was undiagnosed at the time. It would appear that none of the newer substances used in the treatment of syphilis have such a rapid effect on the progress of the interstitial keratitis, and it is unfair of the venereologist to expect the ophthalmic surgeon to treat these patients unaided.—I am, etc.,

London, W.1. G. M. SANDES.

Voluntary Euthanasia

SIR,—Dr. Halliday Sutherland is reported in the Press to have said to an Irish press representative that the Society for Euthanasia is always rushing into print in your columns. I presume he refers to the Voluntary Euthanasia Legalization Society, of which I was Chairman of Committee until recently. I cannot remember ever seeing an article in your columns on euthanasia, though there have been occasional references to it in letters, and there may have been an article years ago. Now Dr. Sutherland, in a letter in the *Daily Telegraph* of July 8, goes further and expresses the hope that you will in future refrain from publishing such letters, and, I suppose, all others which do not meet with his approval.

I wonder if Dr. Sutherland knows that the Voluntary Euthanasia Legalization Society does not now, and never has, advocated mercy killing at the whim of the doctor, as he seems to suppose, but seeks by the education of public opinion to establish the right of an incurable and suffering patient to ask for and obtain relief under proper safeguards.—I am, etc.,

Leicester. N. I. SPRIGGS.

Women in Medicine

SIR,—Your footnote to the letter from Miss Josephine Barnes (*Journal*, May 22, p. 1210) states that in January, 1954, there were 10,800 women on the *Medical Register*. The annotation "Women in Medicine" (*Journal*, May 15, p. 1143) states "there are now 7,600 women doctors' names on the *Medical Register*" and goes on to say "this is an impressive number," implying that this number denotes the total number of women on the *Register*. These figures are so at variance that I can only assume that one was made in error. If this is so it is a pity that the error was not corrected in your footnote on May 22. Indeed, although I am quite sure this was not intended, the footnote seemed to imply doubt as to the accuracy of the count of 13,374 women's names in the *Medical Directory* published in March, 1954—a count made on behalf of the woman-power committee of the Medical Women's Federation.

Both the *Medical Register* and the *Medical Directory* contain the names of all medical practitioners eligible to practise in Great Britain whether they have qualified in Great Britain or the Commonwealth or in Eire, and also contain the names of practitioners (mainly refugees) who have qualified in European universities but have been accepted by the G.M.C. for practice in Great Britain. While a large organization like the B.M.A., in close touch with the G.M.C., would naturally choose the *Register* from which to make a count of practitioners' names, there are many advantages in using the *Medical Directory*. The *Medical Directory* compiles its list mainly from returns of an annual schedule. The names of untraceable practitioners are not included. Addresses are more up-to-date and details of present and past employment are given. In some cases where practitioners qualifying in Great Britain and Eire are working overseas, two addresses are given, one in Great Britain and one in country of present employment. Perusal of the *Directory* also reveals that many practitioners qualifying in the Commonwealth (especially from Australia, New Zealand, Hong Kong, Malaya, and India) and also Eire are now in permanent practice in Great Britain and Northern Ireland.

A close comparison cannot be made between the *Medical Directory* and the *Medical Register* owing to the fact that the latter does not close for press until December 31, when a considerable amount of the *Directory* has already been printed. However, the *Directory* does include a "late list" and takes note of any additions to or omissions from the *Register* from a list issued monthly by the G.M.C.

I understand that the G.M.C. has now returned to the pre-war practice of combing the *Register* for untraceable names and have recently gone through the names from A to C, sending out circular inquiries to be answered within a stated time. Should a reply not be received the name would be removed from the *Register* as "Untraceable." Recently 1,500 names have been removed from the *Register* because they could not be traced. I do not know how many of them were women, but as the proportion of medical men to medical women appears to be about 6 to 1 this number might not be more than 250. The *Medical Directory* prints the names of those qualifying in 1953 on the *Provisional Register* in their alphabetical list, but marks them with an asterisk. The number of medical women so included in the 1954 *Directory* was 341. In addition 75 women, mostly with Dominion or Irish qualifications, were added to the Permanent *Medical Register* during 1953 and were included in the *Directory* of 1954.

After a very careful count (made in pages of ten at a time and checked) the total number of names of medical women in the 1954 *Medical Directory* was 13,374. This includes the 341 names of women on the *Provisional Register*. It does not include any names where there was doubt as to sex, —for example, with christian names like Evelyn, Christian, Sidney.

If the *Medical Register* does not close for printing till December 31 I presume that the count referred to in your footnote in the *Journal* of May 22 must have been from the 1953 *Register*. Even so, the discrepancy between your figure of 10,800 and the *Directory* figure of 13,033 (the figure when "provisional registrations" are subtracted) is too great not to require some explanation. Can it be that the 10,800 names include only the names of those medical women giving *addresses* in Great Britain and Northern Ireland, and do not in fact represent the total number of women on the British *Medical Register*? Or is the number indicative only of those *qualifying* in Great Britain and Northern Ireland, and, if so, what of the large numbers qualifying in Eire or the Commonwealth but practising in this country? At international congresses we are often asked how many medical women are on the British *Medical Register*, and up to now we have not known. It would not look well to leave these contradictory figures published in the *British Medical Journal* unexplained.—I am, etc.,

Bramhall, Cheshire. MABEL LINDSEY.

*** We regret that the figure 7,600 in the annotation was inaccurate. The figure of 10,800 women doctors was taken from the *Medical Register* as it stood at January 1, 1954; this figure has since been brought up to date to 11,100, and is for medical women living or working in the United Kingdom only. To this should be added an unknown number of medical women whose names have been removed from the *Register* because they cannot be traced, and those who are provisionally registered and listed in the *Medical Directory* but not in the official *Register*. This would seem to explain the difference between Dr. Lindsey's figures and ours.—ED., *B.M.J.*

Surgical Wound Dressing

SIR,—I was interested to read the article on a new plastic dressing by Messrs. C. G. Rob and H. H. G. Eastcott (*Journal*, July 3, p. 17). It has been my practice in this hospital for the last two and a half years to dispense with any form of surgical dressing in a clean wound, other than a bridge to prevent the patient's clothes from catching in the sutures. This bridge is made from a length of old rubber tubing, cut longitudinally in half, and holes are punched at roughly half-inch intervals along its length. When required, any length can be cut to fit the size of the wound. The ends can be chamfered if required. This bridge is kept in place by small pieces of strapping at right angles to the long axis of the tubing. It is ideal for all abdominal wounds, and more especially for those in the inguinal region. The bridge moves in all planes and gives rise to no discomfort, nor so far has there been any reaction from the rubber.

In 500 to 600 cases there has been no case recorded of wound infection directly attributable to lack of dressings.

Having now given up the use of Michel clips, for which this bridge was designed, and by using braided nylon sutures for the skin, I am wondering whether any post-operative dressing is necessary. As with the plastic dressing, haemostasis is essential. The cost is negligible.—I am., etc.,

Chichester, Sussex. DOUGLAS G. MARTIN.

Homosexuality

SIR,—May I briefly reply to the critics who rose to my letter (*Journal*, June 5, p. 1326)? In it I asserted what, in my view, most people in this country thought of homosexuality, and also a result that could follow the changing of the law so as to legalize adult male homosexuality. The critics neither denied nor attempted to deny these assertions.

The very last person to deal with the problem of homosexuality is the psych (-ologist, -iatrist, or -oanalyst), in contradistinction to his suitability to deal with the individual case of it. He is too much emotionally involved and is incapable of distinguishing between matters of principle and of expediency. He wants to legalize male adult homosexuality, which to my mind involves a breach of principle, and the reasons he gives are matters of expediency—the horrors of blackmail, the uselessness, except as a matter of mere segregation, of imprisonment, the degeneration of

prisoners that is bound to ensue under present prison conditions, the cruelty of punishing a man for a habit that was often forced on him as a boy, and the injustice of punishing a man for a constitutional defect—all of which have my utmost sympathy but not to the extent of breaking a principle. In short, homosexuality is an evil that must be firmly squashed and as kindly as possible consistent with the firmness. But there must be no sloppiness—"the poor fellows can't help themselves"; it has a salutary effect to suppose they can.

There are two aspects of homosexuality that make it a national danger: (1) Its extreme contagiousness. Mr. Justice Glyn Jones said in a case at Swansea (July 7) in which eighteen persons were involved: "This case provides a striking example of the appalling mischief which would spread if homosexual vice were left unchecked by law." Another Judge in a case at Taunton some months ago, in which there were seventeen defendants, said that it "spread like wildfire." (2) Its long-term nature; the boy seduced to-day may be the active, hunting homosexual in 20 years' time. East and Hubert[1] found in a series of homosexual prisoners that the commonest environmental factor was seduction in childhood.

Beyond these warped individuals is that great army, the youth of the nation, hundreds of thousands of cadets and scouts, millions of schoolboys and students, all of whom are going through or have gone through a stage when they are naturally and exclusively attracted by members of their own sex, when they are particularly vulnerable to suggestions of homosexuality. These are the people who matter most. Any flabbiness, any legalizing of homosexuality, would put into their logical minds the inference that this sort of indulgence is not wrong in itself, but just a matter of age, like smoking but with a higher age limit. That would be disastrous. Our legal and moral affinities are not with continental countries, but with the U.S.A. and the Dominions, who are in this matter, in substance, at one with us. There is no place in this country for moral nihilism in the sexual or any other sphere, and most certainly not in the medical world.—I am, etc.,

Beckley, Rye. C. G. LEAROYD.

REFERENCE

[1] *Report on the Psychological Treatment of Crime*. 1939. H.M.S.O., London.

Drinking Sea-water

SIR,—Dr. G. R. Hervey's interesting letter (*Journal*, June 26, p. 1494) does not explain why castaways should not drink limited quantities of sea-water. It is, of course, true that if a salt solution, such as sea-water, which contains roughly 3.5% sodium chloride, is ingested, intracellular dehydration will result because the urine cannot excrete a greater concentration than 2% sodium chloride. However, no matter how severe the dehydration, the kidneys continue to excrete about 450 ml. daily until irreversible changes take place, so that any volume of sea-water less than 257 ml. should be adequately excreted.[1]

I have performed two limited investigations along these lines, which may be of interest. In the first investigation three men remained adrift in a boat for one week while drinking an average of 360 ml. of fresh water daily. All three were severely dehydrated, and in spite of haemoconcentration, plasma chlorides showed a steady fall until the sixth day, when the men rinsed their mouths in sea-water in order to try to remove the unpleasant taste of ketones. As a result of this I could see no objection, and some possible benefit, in mixing some sea-water with the fresh water. I persuaded two different men to remain confined in a room for one week while one drank 100 ml. of sea-water mixed with 300 ml. of fresh water daily, while the other drank 60 ml. of sea-water mixed with 340 ml. of fresh water daily. The first mixture approximates to normal saline. The man who was having it was desperately thirsty especially after a drink of mixture. He could taste nothing but salt; he felt weak and was ataxic. His weight loss approximated to that of the subjects in the first investigation, and his urinary output was greater (553 ml. daily). The other man showed less weight loss, he enjoyed drinking his mixture, and on the sixth day he was allowed, at his own request, to walk three miles. His urinary output was at the normal basic level (450 ml. daily).

I would suggest as a result of these two limited investigations, the details of which are too long to recount here, that it is probable that for temperate climates a mixture of sea-water: fresh water, in the proportions of 1:5.7 (0.52% hypotonic saline) should save fresh water and give benefit to the victim. Further values could be obtained for different climates. A marked cup could easily be supplied to all lifeboats in order to make the dilution. This would be a simple and unambiguous manœuvre—I found anything which was a little complex was unsatisfactorily carried out if there was much dehydration. A daily intake of 400 ml. of the mixture should give a man a fair chance of rescue—at least two weeks' survival. Rationing which is too strict will mean death while there may be fresh water left. Glucose should also be supplied, and I would suggest from my limited experience that an intake of 80–100 g. daily should give the maximum economical effect.—I am, etc.,

Dublin. T. T. CHAPMAN.

REFERENCE

[1] Ladell, W. S. S. (1943). *Lancet*, 2, 441.

A Question of Seniority

SIR,—Mrs. Gweneth Whitteridge has given an admirable summary (*Journal*, June 12, p. 1379) of the existing evidence for the dates of the foundation of the hospitals of St. Bartholomew and St. Thomas. As is apparent from her letter, St. Thomas's Hospital has no record of its foundation date, and, unless further information comes to light, cannot hope to prove its existence prior to 1123.

The earliest references to the hospital, apart from that in the *Bermondsey Annals* already noted by Mrs. Whitteridge, are in the hospital cartulary, of which the first pages are unfortunately missing. The documents transcribed in it include an indulgence to all those "who regard with solicitude the hospital and poor of St. Thomas of Southwark." The reasons given were that the old building had been burnt down, the place where it previously stood was too narrow and small for its re-erection, and the building on a better site was proving very expensive. This shows that the hospital of St. Thomas was already old in 1212, the date of the fire.

Just how old this pre-1212 building was, it is impossible to say. The fact that it had outgrown its site suggests that it had been there for some considerable time. The giving of hospitality to travellers was one of the obligations of the Augustinians, and this may well have led to the provision of simple medical treatment for such travellers as fell sick. Although proof is not possible in the light of present knowledge, the work of healing may quite possibly have been contemporary with the establishment of the house and thus date from 1120 or even earlier.—I am, etc.,

London, S.E.1. E. M. MCINNES,
Archivist to St. Thomas's Hospital.

Piperazine Adipate in the Treatment of Roundworms

SIR,—During the past six months I have been employing piperazine adipate ("entacyl") extensively in the treatment of threadworm infestation. The results have been very satisfactory and I have not encountered any side-effects. In two of these cases, where roundworms were also present, entacyl appeared to be strikingly effective. The first, a child of 2 years and 9 months, on a dosage of 300 mg. twice daily, had passed 27 roundworms on the third day, a further 7 on the fourth, 5 on the fifth and 3 on the sixth day of treatment—a total of 42 roundworms. After this no further roundworms were passed. The second case, a child of 2 years, on the same dosage passed three roundworms on the third day of treatment. I have not seen any recent reference in the literature with regard to the treatment of roundworms with piperazine adipate only, but I feel that this drug is worthy of further trial.—I am, etc.,

Dublin. D. P. O'BRIEN.

Acquired Bacterial Resistance to Antiseptics

SIR,—Urogenital and gynaecological wards suffer from prolonged periods of cross-infection during which patients become infected with identical strains of the *Proteus* and/or *Pseudomonas* group of organisms. No specific test is in existence for identifying these strains, such as phage-typing, but for practical purposes one can call strains identical when they have similar biochemical reactions and they are similarly affected by chloramphenicol, streptomycin, and terramycin.

Medical and nursing staff nowadays are punctilious in using "non-touch technique" and surgical asepsis, so attention was given toward dust and disinfectants for the source of pathogens. Containers, holding Cheatle forceps, have been found to hold contaminated antiseptics. The Cheatle forceps thus carried pathogens on to all sterile articles caught in their grip. Strains of *Proteus* and *Pseudomonas* have been isolated from 5% "dettol," 5% liq. chloroxylenolis. From other containers *B. subtilis* was isolated from 0.1% biniodide of mercury and 5% phenol; non-faecal *coliforms* from 1% "cetavlon." Some of these strains proved to be 30 times more resistant than similar organisms which had not become acclimatized to an antiseptic environment.

It would appear necessary to use the "local" strain of pathogen and not the stock strain for determining the strength of an antiseptic to be used in a ward harbouring infection, and that the antiseptic is prepared by the dispensary to prevent "topping-up" of containers with water on the ward. The safest measure is to use a different antiseptic on alternate months, such as 1 in 10 dettol alternating with 1 in 20 carbolic, for immersion of Cheatle forceps, and 1% cetavlon alternating with 1 in 2,000 "bradosol" for hand lotions. This procedure has been introduced in one of the local hospitals in the hope of eradicating any "local" pathogen which is augmenting its resistance to the antiseptic in routine use. It is of interest to know whether similar measures are already in existence elsewhere.—We are, etc.,

Watford, Herts. HERTA SCHWABACHER.
London, W.13. W. HOWARD HUGHES.

Proposed Coat of Arms for B.M.A.

SIR,—In the event of future hostilities it is to be presumed that we shall be marched to the scene of action by our newly armigerous President in person, and that his knightly helm—which is missing in your illustration (*Journal*, June 26, p. 1491)—will by then be surmounted by the rather spidery looking crest which has been devised for the purpose. My fear is that in the heat of battle—or even if there were a high wind—he might find that its component parts are in unstable equilibrium. It may be, however, that the sciences of heraldry and physics have taken council, and that the unrevealed purpose of this curious edifice is to function as the aerial of a presidential "walkie-talkie" apparatus. If so he will be able to direct operations more safely from some well-concealed hideout. It seems possible, however, that this might become evident to the enemy on account of the suspicious appearance of his burly supporters, who are quite obviously in fancy dress.

These important possibilities seem to raise other difficulties which might affect the war-time efficiency of our Association. It is understood that the Minister of Health would render no help, and that matters of such moment might lie outside the terms of reference of the College of Heralds. In these circumstances should not the matter be referred direct to the Chiefs of Staff Committee whilst there is still time?—I am, etc.,

London, W.1. W. S. C. COPEMAN.

SIR,—The criticisms of the proposed coat of arms (*Journal*, July 10, p. 102) seem to come from people like myself having an interest in, and a slight acquaintance with, heraldry. The arms were, I believe, designed by a King of Arms, who should know something about the matter, and we should be a little cautious in our criticisms lest our attempts to air our knowledge do the reverse.

The absence of a helmet in your illustration (*Journal*, June 26, p. 1491) is of no importance, for the type of helmet and the tinctures of the mantling would follow the usual practice. The suggestion that the Lord Lyon should be consulted seems wrong. The headquarters of the B.M.A. are in London, so Clarenceux seems obviously the proper person to approach. If the Lord Lyon had been consulted, and it was desired to show the connexion with Sir Charles Hastings, it is likely that he would insist on the inclusion of the maunch. I believe that Scottish heralds would regard any Hastings as connected with the "chief of the clan."

As for the question of lions and leopards, this is really irrelevant, but the practice of referring to a "lion passant guardant" as a "lion leopardé," or a "leopard," has been out of date for about four centuries. While it may be inaccurate to say that the torse "was always in the main colours," the addition of the words "unless otherwise specified" would put things right. Some other minor criticisms may or may not be justified, but it is certain that the proposed arms were not designed without due care and attention. I hope some heraldic expert will reply to the critics. We ought to know all about our arms.—I am, etc.,

Grays, Essex. J. S. HAWES.

Section of Dermatology at Glasgow

SIR,—I think all who attended the Dermatological Section of the British Medical Association Meeting in Glasgow will agree on the excellence both of the papers and the clinical meeting in the afternoon, and this no doubt applies to other Sections. It is a pity, therefore, that so few dermatologists of registrar status or junior consultants who are not as yet members of the British Association of Dermatology were present. It would have provided them with an opportunity for hearing opinions from other schools and of getting to know other dermatologists. Put at its very lowest, they might have made contact with, or even impressed, some dermatologist who would later be concerned in the selection of candidates for some future appointment. I hope next year there will be a much better turn-out of young dermatologists, and I appeal to all senior consultants to encourage their younger men to attend the B.M.A. meeting and to release them for the very short time required to attend the Dermatological Section.—I am, etc.,

Leeds, 2. F. F. HELLIER.

POINTS FROM LETTERS

Role of Smoking in Bronchitis

Drs. P. H. A. JONASON and E. R. JONASON (East Harling, Norfolk) write: Dr. K. N. V. Palmer's recent article (*Journal*, June 26, p. 1473) on the role of smoking in bronchitis confirms an impression which one has gained in general practice. It would take considerably longer for a general practitioner to collect such a group of cases, especially in a country practice. Nevertheless, it is our impression that there is a similar correlation between the incidence of sinusitis and tonsillitis in smokers as compared with non-smokers in an agricultural population in this part of rural England.

Coal-miners' Nystagmus

Surgeon Captain L. A. MONCRIEFF (Kingsbridge, S. Devon) writes: It may perhaps come as a shock to some of the experts on miners' nystagmus to know that a managing director and recognized authority on colliery affairs informed me some years ago that this could be feigned, and further told me the technique. I naturally do not see that anything is to be gained by publicizing the details, but, having had some first-hand experience of industrial medicine, I must say his statement caused me no surprise.

Prophylactic Penicillin for Minor Casualties

Dr. G. H. M. FRANKLIN (Prees, Shropshire) writes: May I congratulate Dr. G. C. Milner on his timely letter (*Journal*, July 3, p. 46) about the foolishness of giving prophylactic penicillin for minor injuries? I too have experienced . . . junior house officers who give penicillin for the most trivial conditions, thereby not only blunting one of the most valuable weapons we possess but also rapidly producing a population that will have no natural resistance to minor infections.

Obituary

T. P. C. KIRKPATRICK, M.D., Litt.D., F.R.C.P. F.R.C.P.I.

Dr. T. P. C. Kirkpatrick, for 44 years registrar of the Royal College of Physicians of Ireland, died in Steevens's Hospital, Dublin, on July 10, after a long and trying illness, in his 85th year. "Kirk"—by which affectionate diminutive he was known to generations of his colleagues—at the time of his passing was the "grand old man" of Dublin medicine.

Thomas Percy Claude Kirkpatrick was born on September 10, 1869, the son of John Rutherford Kirkpatrick, M.D., F.R.C.P.I., King's Professor of Midwifery in Trinity College, Dublin. From Foyle College, Londonderry, he went on to Dublin University, where he graduated M.B., B.Ch. in 1895, proceeding M.D. in the same year. He was one of the first to specialize in the young art of anaesthesia, and was lecturer in that subject at Trinity College. Appointed assistant physician to Steevens's Hospital in 1900, three years later he was promoted to the post of visiting physician. On December 22, 1953, his colleagues in the hospital presented him with his portrait in recognition of his half-century of service to that institution.

He was elected a Fellow of the Royal College of Physicians of Ireland in 1904 and became registrar four years later. As time went on he became more and more absorbed in literary work, and the papers and books he wrote on matters relating to the history of medicine in Ireland were among the best of their kind. He was a doctor of literature of both Dublin University and the National University of Ireland, the latter university conferring this degree on him during the Annual Meeting of the B.M.A. in Dublin in 1933. At that meeting he was president of the History of Medicine Section. In 1942 he was elected a Fellow of the Royal College of Physicians of London.

We are indebted to Mr. WILLIAM DOOLIN for the following appreciation: Kirkpatrick's medical studies had been based upon a sound classical education, and his years of practice revealed the *grammaticus* rather than the *medicus* in his inclinations. A lover of books, and a careful collector, he had been for years a member of the Irish Bibliographical Society, and one of the firmest friends of the great library of Trinity College. A bachelor, he was one of the most "clubbable" of men, delighting in the company of friends who shared his love of good books, good wine, good pictures, and good talk. In such company, "Kirk" was to them what a vintage port is to a good dinner: his was a vintage personality.

A deep and earnest Christian, he was the most charitable as he was the most tolerant of men. No unkind word, no harsh criticism of another's action, was ever uttered by him. The worst that ever I heard about one whose character he disapproved of was: "I don't think he's a very nice person"; it was the signal to pass to another topic.

At the last Christmas dinner of the Strollers' Club to be held in the Great Hall of his College, when called upon to reply to the toast of "the guests," I told the company present that 40 years earlier "Kirk" had given me my first lessons in the art of administering an anaesthetic, and that through all the years which had followed I had been his pupil in the art of living. How true those words have been! For, to "Kirk," the art of living lay ever in gentleness and generosity of soul, an art best cultivated in the company of his friends. With Belloc, he of all men could truthfully sing that none had

> Had quite such pleasant friends as mine,
> Or loved them half as much as I did.

Looking back in the mirror of those years of pupillage and friendship, the reflection is always the same—that of the friendly, smiling face of the man always ready to do the kind and helpful thing, whose sympathy was quick to see what should be done; the friend who, dissolving all difficulties, made life easier and more delightful for his good-natured action.

As the war ended, "Kirk" had completed his twenty-fifth year of office as general secretary to the Royal Academy of Medicine in Ireland. At a dinner in the Shelbourne he was presented with a silver salver bearing the facsimile signature of every member of the Council of the Academy. No happier dedicatory inscription engraved on the rim of the salver could have been selected than that chosen for us by the friend of his youth, Ernest Alton, Provost of Trinity College: *Vir amabilis ad societatem, magis amicus quam frater.* "Kirk" had been indeed to many in the room that evening "the friend who sticketh closer than a brother."

He figured so largely, and withal so modestly, in so many aspects of Dublin life: in his hospital, in writing whose *History* he has left for all who come after an inexhaustible source for the study of the golden age of Dublin medicine; in his university, the story of the two centuries' growth of whose school of physic is a similar source-book for the medical historian; in his college, that of the Irish Physicians, as whose registrar he has been for almost half a century the guide, philosopher, and friend of a long succession of presidents. In other fields than the medical, he had been president of the Royal Irish Academy; although he had not a note of music in his head, he had been the well-beloved president of the Strollers' Club for more years than one can reckon—never missing a meeting through all those years. At each of their pleasant dinner-parties his eagerly anticipated speech of greeting to their guests was a carefully prepared and as harmonious a performance as any given by their famous "Band." Near by in St. Stephen's Green he presided no less benevolently as the friendliest of brothers. In all these separate gatherings of men he won a like affection, for the enviable gift of friendship was his in full measure, pressed down and running over. He was, in our hurried professional life, unique in our society for his *urbanitas*, a true son of Horace, knowing neither pride nor prejudice in his dealings with men of all classes and all creeds.

I was his guest at his last Strollers' dinner. Mine will be the happy, though regretful, memory that he had had his last Christmas dinner in my house. Driving him home that evening, I saw that he was in pain, although no word of complaint had fallen from his lips. A few days later, other hands gently bore him to his own hospital, in whose service it had always been his hope that he should die "in harness." There, now, the long grey years have vanquished him. We think of him to-day as one of

> Those immortal dead who still live on
> In minds made better by their presence.

D. McCRAE AITKEN, M.B., F.R.C.S.

Mr. D. McCrae Aitken, well known as an orthopaedic surgeon in London, Liverpool, and Shropshire, died at his home in Kirkby Lonsdale on July 9. He was 77 years of age.

David McCrae Aitken was born in Singapore on December 11, 1876, and was educated at George Watson's College and Edinburgh University. After graduating M.B., Ch.B. in 1901 he held a number of resident appointments in hospitals in Scotland and England, including that of senior house-surgeon at the Royal Southern Hospital, Liverpool. He was also for a time a demonstrator of anatomy at the New School of Medicine in Edinburgh and, later, at the Middlesex Hospital. Having decided on a surgical career, he took the F.R.C.S. of Edinburgh in 1904 and the F.R.C.S. of England in 1908. After holding the post of resident medical superintendent of the Bolingbroke Hospital in

Wandsworth, he took up orthopaedic surgery as a specialty and settled in London. Early in his career he became closely associated with Sir Robert Jones, and eventually he was appointed director of surgery at the Robert Jones and Agnes Hunt Orthopaedic Hospital at Oswestry. He was also on the staff of St. Vincent's Orthopaedic Hospital, Pinner, and of the Faversham Cottage Hospital. During the first world war he worked at the Military Orthopaedic Hospital at Shepherd's Bush. Aitken's first contribution to the literature of his specialty appeared in 1905, and a few years later he was co-author with Robert Jones of the chapter on "Deformities" in Latham and English's *System of Treatment* (1912). In 1931 he gave the Owen Thomas Memorial Lecture at Liverpool, and four years later he published a critical study of Thomas's work. One of the founders of the Section of Orthopaedics at the Royal Society of Medicine, Aitken was president of the section in 1929–30. He retired from practice in 1948 and went to live in Westmorland.

We are indebted to Sir HENEAGE OGILVIE for the following appreciation: At the end of the first war I went to Birmingham as an orthopaedic trainee under Naughton Dunn. With Dunn I attended Agnes Hunt's hospital at Baschurch, and there met Robert Jones and McCrae Aitken. In 1920 I became Aitken's assistant at St. Vincent's Hospital. I was his pupil and colleague for fifteen years, and remained his admirer after our association ceased.

I believe that Aitken came to London from Liverpool just before the first war as Robert Jones's private assistant. Till Jones's death he was his right-hand man, attending his consultations, helping him at operations, caring for his patients afterwards. He was one of the surgeons who opened the famous Military Orthopaedic Hospital at Shepherd's Bush. He transformed St. Vincent's from the small cripples' home that he found to the large open-air orthopaedic centre that it is to-day. He was a founder of the Section of Orthopaedics at the Royal Society of Medicine, and a well-known figure at all its meetings and at those of the British and the International Orthopaedic Associations.

As an operator Aitken was adequate. He knew his anatomy, he worked slowly, carefully, and gently, and he adhered meticulously to no-touch technique. As a producer of results he was far more than adequate, he was a master. Following Robert Jones of the gentle smile and the iron hands, he was an expert at manipulation, and probably his best results were obtained in the treatment of those deformities of childhood—congenital talipes, congenital subluxation of the hip, and adolescent scoliosis—in which repeated manipulation and constant care through the years are more important than operations.

As a young man Aitken was a great sailor. He introduced me to the Royal Corinthian Yachting Club and the Cruising Association. When I first knew him he was too frail to go afloat often. He had some lesion of the larynx, whose nature I never knew, that gave his voice that harsh bark that many will remember.

McCrae Aitken had all the good qualities of the Scot. He was courageous, patient, persistent, warm-hearted, supremely honest and loyal under any test to his chief, his colleagues, his friends, and his ideals. These qualities made him what he was, a really great orthopaedic surgeon.

H. A. DUNLOP, M.Sc., M.D., F.R.C.P.

The obituary of Dr. H. A. Dunlop was printed in the *Journal* of July 10 (p. 103). Dr. M. N. OSTER writes: May I, who had the privilege and advantage of Hugh Dunlop's friendship, be permitted to pay a tribute to his remarkable personality? I knew him as an undergraduate at King's when he joined the influx of students who, for the greater part, had been through the first world war, and who were much older than the boy who had just left Midhurst Grammar School. We found him shy, modest, and retiring, but we soon learnt that his intellectual capacity was far beyond the average. We naturally turned to him for the elucidation of a problem, and, although he offered his explanations with diffidence, we found that he was invariably our master. The proof of his ability was the impression he made on his fellow students.

His memory was phenomenal, and the range of his studies—outside medicine—was deep and extensive. He carried off every available prize and scholarship, and the greater his success the more his modesty and sincerity increased. He was one of those rare students who qualified at the Conjoint examinations before he was 21, and thereafter he held every junior post at the Westminster. While a student at King's he lectured on anatomy at the Working Men's College in Camden Town, and no more popular teacher ever adorned the staff of this unique institution. He was by nature modest and generous to the end of his life and, above all, a staunch friend and an honest man. He surpassed all his contemporaries in the splendour of his imagination, and those who knew him well realized that his brain was an intellectual ocean whose waves touched all the shores of thought. His instruments were reason, logic, facts, and, above all, example. Thus he won the admiration and respect of his teachers and those who, later, were to become his students. His strength lay in perfect kindness, and he shared his intellectual wealth with his fellow men. He did all that was in his power to help others towards success, and he never sacrificed principle to expediency. His gentle and upright character can be found only in those with the highest morals and integrity. His friends, who regarded him as their mental superior and the most disinterested of men, will extend their heartfelt sympathy to his wife and sons, who, with many others outside the family circle, will long remember an earnest, generous, and sterling man.

Dr. P. H. MIDGLEY died at his home at Hale, Cheshire, on May 28 after a long illness. He was 64 years of age. Patrick Haworth Midgley was born on December 3, 1889, and was educated at Bootham School, York, and at Manchester University, where he had a distinguished career as a student, gaining honours and a medal in pathology and graduating M.B., Ch.B., with distinction in surgery, in 1912. After holding the appointment of house-surgeon at Manchester Royal Infirmary he settled in practice at Hale, where he spent nearly the whole of his professional life. Beloved by his patients and esteemed by his colleagues, he was chairman of the Mid-Cheshire Division of the B.M.A. in 1931–2. He was not only a highly skilled and painstaking doctor but an ever-helpful adviser upon the many personal problems of his patients' lives. Dr. Midgley came of Quaker stock and was a loyal member of the Society of Friends. During the First World War he served with the Friends Ambulance Unit at Uffculme Hospital, Birmingham, an auxiliary branch of the 1st Southern General Hospital, and he was a member of the council of the Friends Ambulance Unit. For many years he was on the committee of Dalton Hall of Residence, where he had lived during his student days at Manchester. Though he rarely spoke in public, his addresses to the Mount and Bootham Old Scholars' Association, of which he was president in 1950, revealed his penetrating mind and deep religious feeling. His delight in music, in gardening, in mountains, and in the Italian language provided his recreations: he played the violin in a quartet which met frequently at his home, and derived great pleasure from the concerts of the

Hallé Society. Dr. Midgley married Miss Ruth Holdsworth in 1920 and she survives him, together with one son and three daughters, the eldest of whom is married to a doctor.—J. H. M. W.

Dr. B. C. STEVENS died at his home at Old Leake, Boston, Lincolnshire, on July 2 at the age of 79. The son of a Congregational minister, Bertram Crossfield Stevens was born at Lostwithiel, Cornwall, on August 18, 1874. Intent on entering the medical profession, he qualified mainly through his own exertions by assisting doctors in their surgeries in order to obtain the capital necessary for his studies. He enrolled as a medical student at St. Thomas's Hospital in 1893 and qualified four years later by taking the diploma of L.S.A. Not satisfied with this initial qualification, he continued his medical studies and in 1899 graduated M.B., B.S. at Durham University, taking the London conjoint diplomas in the same year. In 1901 he not only proceeded to the M.D., gaining a gold medal for his thesis, and to the M.S., but he took the F.R.C.S.Ed. as well. The Oxford D.P.H., which followed in 1908, decided his career, for he spent the greater part of his working life in the public health service. Before entering this service, however, he had held the appointment of junior assistant house-surgeon at Huddersfield Royal Infirmary, remaining there long enough to become senior house-surgeon, and had been for a period in practice in Lancaster, where he became anaesthetist to the Royal Infirmary. In 1910 he was appointed assistant medical officer of health for Ayrshire, occupying the post until shortly before the first world war, when, after a brief spell in the public health department at Hartlepool, he became medical officer of health for the Barnes Urban District Council. At Barnes he also acted as medical superintendent and bacteriologist at the isolation hospital, tuberculosis officer to the sanatorium and dispensary, school medical officer under the Surrey County Council, and medical officer to the Barnes and Mortlake school clinic and infant welfare centre. In 1920 he was appointed deputy medical officer of health for Portsmouth, but left there two years later to become medical officer of health for the Borough and Port of Grimsby, which post he held until he retired in 1934. During the last war, however, he came out of retirement to act as medical officer of health for the Urban District of Carlton, Nottinghamshire. After he had retired, Dr. Stevens was able to satisfy his love of travel, becoming a ship surgeon and visiting the Far East and the West Indies, and ultimately relating his experiences in a book entitled *Reminiscences and Reflections of a Medico on Land and Sea*. A man of fastidious taste, of a reserved disposition, and with a sincere religious faith, he set for himself the highest ethical standards and lived up to his own ideals. He suffered his long illness with great fortitude and calmness.—M. L. W.

Medico-Legal

HOT-WATER BOTTLE BURNS

The North-Eastern Metropolitan Regional Hospital Board and the Edmonton Group Hospital Management Committee were ordered to pay £7,000 damages in the Queen's Bench Division last week to a woman who alleged that because of burns she suffered in hospital from hot-water bottles she could no longer dance, swim, or go for long walks and she was left with a scar on her thigh which was a grave disfigurement. The plaintiff was Mrs. M. J. Farley, aged 30. The defendants admitted liability but contested the amount of damages.

On August 14, 1951, two operations were performed on Mrs. Farley, one in the early morning and one at midday. Between the operations she was returned to bed, wrapped in blankets, and two hot-water bottles were placed against her. When she was taken back to the operating theatre it was discovered she had been severely burned on both thighs by the bottles. Two skin-grafting operations were carried out in September, 1951, and she left hospital in October. She said she could not walk two miles without resting. She suffered pain from where the skin-grafting had been carried out. She could not dance more than half-way round a dance floor because of pain and fear of collision. Walking and dancing had been her usual pleasures. Medical experts had said Mrs. Farley's scar could be reduced. But it would take three or four operations at intervals of six months. She would like to have the operations, although she was nervous about them.

"This is a very serious case," said the judge. "The court had had the opportunity of observing the scar on Mrs. Farley's left thigh. The area of 9×3½ in. (23×9 cm.) presents a terribly unsightly view. I am satisfied that her complaints of present pain are true. She carries a shocking disfigurement which only a series of operations spread over a prolonged period can change. Her enjoyment of life has been impaired. While still young she has become a changed woman."

MURDER BY MENTAL DEFECTIVE

[FROM OUR MEDICO-LEGAL CORRESPONDENT]

On July 13 the Court of Criminal Appeal[1] dismissed the appeal of Derek Clide Adams against his conviction for murder at Exeter City Assizes on June 16.

Adams, a 31-year-old patient at the Royal Western Counties Institution, Starcross, was the tenth of a family of twelve born to feeble-minded parents. He lost his father when he was 7, his mother when he was 12, and had been at Starcross for 15 years as a mental defective. He was feeble-minded, with a mental age of about 9 years, but although he needed supervision when at work his conduct had been sufficiently good for him to be allowed out on holiday in 1951, and occasionally on parole.

When he was able to come to Exeter Adams was in the habit of occupying the same room as Mrs. Rosemary Rowe, a married woman with two children living apart from her husband with her parents, and it was their intention to marry when Mrs. Rowe obtained a divorce.

On March 11, 1954, Adams was absent from the institution without leave. On that day Lewis John Pile, of whom Adams was exceedingly jealous, was released from Exeter prison and visited Mrs. Rowe's house. At 8.50 p.m. two police officers came to the house to take Adams back to the institution and knocked at the door of Mrs. Rowe's room. Adams was there and asked to be left alone for five minutes. His request was granted. At the end of the five minutes the police officers knocked again. There was a scream, the door opened, and Mrs. Rowe fell into the police officers' arms with a stab wound from which she died in a few minutes.

Adams, who was standing by the door with a blood-stained knife in his hand, said, "Oh, Rosemary, what have I done?" He made two verbal statements—"It was because of the other man who came out to-day," and, "I did not mean to do it. I loved her." He also made a written statement to the effect that she said that when "Dan" came out of prison he was going to get her, but that he (Adams) told her that if he could not have her Dan should not.

In evidence, Dr. D. Prentice, medical superintendent at the institution, said that Adams knew that certain things should not be done, but had never previously threatened anyone with a knife. There were limitations to his sense of right and wrong, and under stress of emotion he would be almost irresponsible for his actions. Dr. M. R. P. Williams, medical officer at Bristol Prison, said that, whilst Adams was undoubtedly feeble-minded, he had no disease of the mind. He found no evidence of what he would call insanity. Dr. C. R. Gibson, surgeon to the Bath police, said that in his opinion Adams was under such a stress of emotion when he stabbed Mrs. Rowe that he did not know what he was

[1] *The Times*, July 13, 1954.

doing. He stabbed her in spite of the policemen at his elbow. He thought Adams was not jealous of Pile. Part of his mind was incapable of development, and he was only just fit to plead. He agreed that the law distinguished between the mentally defective and those who were insane under the M'Naghten Rules.

The jury returned a verdict of murder with a strong recommendation to mercy, and before sentencing Adams to death Mr. Justice Streatfeild said that this recommendation would be conveyed to the proper quarter.

In giving the judgment of the Court of Criminal Appeal dismissing the appeal, the Lord Chief Justice said that it was disturbing to know how easily mental defectives could escape. He did not agree that all the doctors had said in evidence that Adams did not know the difference between right and wrong. The case would no doubt receive careful consideration elsewhere where matters might be taken into consideration which could not be considered by the court. The difference between the medical profession and the law in this field was that the law was concerned with responsibility. A man might be quite mad in some respects and properly certified as insane, but if he knew the difference between right and wrong he was in law responsible.

Medical Notes in Parliament

MEDICAL ADVERTISING ON TELEVISION

Medical advertising on the programmes of the proposed Independent Television Authority was discussed again when the House of Lords considered the Television Bill on report on July 14. Earl JOWITT moved an amendment to the Second Schedule to prohibit advertisements of any article consisting of or comprising a substance recommended as a medicine. He said that he wanted to stop advertisements of so-called "medicine." He was in favour of throwing physic to the dogs and of taking medicine only when it was prescribed by a doctor. People were much too medicine-minded, and spent vast sums in dosing themselves with all sorts of pills. Let them eat wholesome food, have a run round the park, take the dog for a walk, and use medicine only when it was prescribed. Lord HADEN-GUEST supported the amendment because, he said, since the Health Service came into operation there had been a great increase in the number of medicines on sale. They had all kinds of elaborate and polysyllabic names. There had also been an increase in the consumption of medicines, which was curious. There were large numbers of "special" medicines—not "patent" medicines—put up by drug manufacturers that were widely circulated. Samples were sent to all doctors, and it was suggested that they should use them. A good many of them, so long as they were not poisonous, could be bought by anyone in a chemist's shop. It was a bad thing that people should do this without first consulting a doctor, so he cordially agreed that it was desirable to exclude advertisements of medicines from the programmes.

Earl DE LA WARR, Postmaster-General, said there were no worse offenders in recommending the use of patent medicines than some doctors. He would understand the logic of Earl Jowitt if he were to introduce a Bill prohibiting all advertisements of patent medicines, but why pick on the new television? He welcomed the amendment only because it gave him the opportunity to refer to the member of the medical profession on the advisory committee on advertising. He had received from a representative of the B.M.A. a letter in which it was stated: "Thank you very much for sending me an advance copy of the line the Government proposed to take. I have since read the account of the debate in *Hansard*, and agree that this protects the position in which we are interested." That meant that the B.M.A. were completely satisfied with what the Government had proposed. The Ministry of Health would also be represented on the committee.

The amendment was withdrawn.

Milk in the Diet

Dr. BARNET STROSS (Stoke-on-Trent, Central, Lab.) asked the Minister of Food on July 12 whether he estimated the present rate of liquid milk consumption as being the optimal, and what steps he intended to take so that the rate of consumption would increase. Dr. CHARLES HILL, Parliamentary Secretary, said the optimum rate of liquid milk consumption could not be estimated in isolation from that of milk products, of the general national diet, or, more particularly, the diet of those whose need for milk was greater or less than the average. All sections of the milk industry, acting jointly, had launched a publicity campaign to encourage the consumption of liquid milk.

Dr. EDITH SUMMERSKILL (Fulham, West, Lab.), commenting on another reply by Dr. Hill that the average consumption of milk had increased, said it was not a valid argument that because there was underconsumption before the war we should be satisfied with present consumption. Dr. HILL replied that the consumption of milk should be taken in conjunction with that of other foods, which in many cases was up.

Colouring Dyes in Food

Mr. NORMAN DODDS (Dartford, Lab.) asked on July 12 if the Minister of Food would impose restrictions upon food processers and manufacturers in relation to the use of dye-stuffs derived from coal tar, having regard to the evidence that the use of such dye-stuffs was in some degree responsible for the increase in the number of cancer cases. Dr. CHARLES HILL said the use of certain coal-tar dyes was already prohibited. The general question of the addition to foods of colouring matters was being considered by the Food Standards Committee. Mr. DODDS asked if it was not a fact that workers handling coal tar had to take special precautions against ill effects on health. Was not this dye used for colouring kippers and other foods? Dr. HILL said the first statement was true, but they should not generalize and so arouse fears and suspicions unless and until there was scientific evidence available.

Glass Fibre Dust Investigation

Sir WALTER MONCKTON, Minister of Labour, informed Mr. ELLIS SMITH (Stoke-on-Trent, South, Lab.) on July 15 that investigations, including microscopical examination and dust counts at factories processing resin-bonded glass fibres, had been completed and had not produced any evidence of dust concentrations injurious to the lungs of the workers concerned. Dr. BARNET STROSS (Stoke-on-Trent, Central, Lab.) asked if that meant that it was accepted scientifically that fibre glass was not an irritant to lung tissue when it was inhaled. Sir WALTER MONCKTON replied that he would not like to say that. All he could say was that after the investigations that he had promised the experts had informed him—after investigations at five factories—that nowhere had it been shown that the processing of this type of fibre had produced concentrations dangerous to health.

Mr. SOMERVILLE HASTINGS (Barking, Lab.) asked how, if other conditions such as dust infection from silica took 10 or even 20 years to develop, it was possible to say after a short time that there was no effect here. Sir WALTER MONCKTON said that these investigations had taken place over a year.

Plans to Deal with Poliomyelitis

Dr. BARNET STROSS (Stoke-on-Trent, Central, Lab.) asked the Minister of Health on July 15 whether he was satisfied that there was a sufficiency of trained staff to deal with an outbreak of poliomyelitis such as occurred in Canada in 1953, and what action was being taken to give special training to nursing staffs in hospitals. Miss PAT HORNSBY-SMITH, Parliamentary Secretary, replied that sufficient trained staff should be available, if arrangements were made to transfer volunteer nurses from the general hospitals to the special units which the Minister had advised regional hospital boards to set up. Most of the boards had already made such

arrangements, and were also arranging for special training to be given to nurses seconded to infectious diseases hospitals. She also said that it was reasonable to think that the trained staff available would be sufficient to deal with an outbreak of the type mentioned. All the fourteen regions already had centres with staff who had considerable experience, but they would obviously have to draw on volunteers if there was any unprecedented outbreak.

Dr. BARNET STROSS asked if the Minister was aware of the large numbers of cases of poliomyelitis that occurred in Denmark in 1952, many of which were of the bulbar paralytic type, and what steps had been taken since then to provide suitable treatment if such an outbreak affected Britain. Mr. IAIN MACLEOD stated that a memorandum was circulated to hospital authorities in August, 1953, on which action had now been taken all over England and Wales. It was prepared, he added, in view of the Danish experience, and dealt in particular with the formation of experienced teams to combat the disease.

Dr. BARNET STROSS asked what was the cost of importing a cuirass respirator of the Monaghan type from the United States for the treatment of poliomyelitis; what research had been undertaken to evolve a similar type in Britain; and whether it was being manufactured. Mr. IAIN MACLEOD said the average delivered cost of the Monaghan cuirass respirators imported recently was £853 including duty. Following officially sponsored research in this country, a new type of cuirass shell had been developed. Twelve sets of these shells were being assembled under contract and would shortly be delivered for clinical trials. He added that the cost of the shells being made here was £120.

45 Copies of Applications

Sir WALDRON SMITHERS (Orpington, Con.) asked the Minister of Health on July 15 what was the outcome of his inquiries with the board of governors at Charing Cross Hospital concerning the requirements of applicants to fill up 45 copies of their qualifications. Mr. IAIN MACLEOD said he was informed that the number of copies of applications required in future was to be brought into line with practice elsewhere. Sir WALDRON SMITHERS asked the Minister what was the reason for the demand, and if he would do his best to reduce the number of Ministry forms that had to be filled up. Mr. MACLEOD said, "Certainly," in answer to the last point. The custom had been going on for a long time in Charing Cross. The reason for it, he understood, was that the hospital used to circulate the applications to all the consultant staff. There were obvious reasons against doing that, and he was glad to say that the hospital had agreed to reduce the number of forms.

Surgery Inspections

Mr. A. BLENKINSOP (Newcastle-upon-Tyne, East, Lab.) asked the Minister of Health how many health executive councils, either directly or through medical committees, had carried out inspections of surgery and waiting-room accommodation in their areas. Miss PAT HORNSBY-SMITH, Parliamentary Secretary, stated on July 15 that this information was not available. Mr. BLENKINSOP asked whether, in view of the report of the Cohen Committee, the attention of executive councils should not be drawn to their responsibility for seeing that surgeries were in a proper condition. Miss HORNSBY-SMITH said the fact that the Minister had sent out no specific instructions did not mean that nothing had been done. The Minister was consulting the profession to see what action might be taken through the executive councils. This followed up the strong recommendation contained in the previous letter sent out by Dr. Talbot Rogers to general practitioners about accommodation. The matter was being actively pursued.

Health Centres

Miss PAT HORNSBY-SMITH stated in reply to Mr. A. BLENKINSOP on July 15 that eight schemes for the provision of health centres had been approved, including four now in operation, and twelve others were under consideration. Mr. BLENKINSOP suggested that in view of the valuable experience gained in the past few years it was time to give further encouragement to local authorities, especially in new housing estates. Miss HORNSBY-SMITH said that some centres were being opened that were not local authority centres, and, provided a genuine need was established, the Minister of Health would favourably consider any project. Opinion was by no means unanimous on health centres, which were still in the experimental stage.

Food Ministry Staff.—The end of food rationing has not made redundant any of the small group of technical and medical officers at the Ministry of Food headquarters concerned with food hygiene, meat inspection, and such matters, the Parliamentary Secretary stated on July 12.

Food-poisoning in Schools.—The Minister of Education said on July 15 that the numbers of outbreaks of food-poisoning in the schools meals service were 40 in 1952, 32 in 1953, and 13 so far this year.

Universities and Colleges

UNIVERSITY OF OXFORD

In Congregation on June 24 the degree of D.M. was conferred upon R. W. Emanuel.

The title of Clinical Lecturer in the University, without stipend, has been conferred on the following for five years from the first day of Michaelmas Term, 1954: *Surgery*, D. A. Abernethy, D. C. Corry, A. Elliot Smith, and J. C. Scott; *Psychiatry*, R. W. Armstrong; *Diseases of the Skin*, A. B. Carleton; *Medicine*, A. M. Cooke, F. G. Hobson, and P. C. Mallam; *Radiology*, F. H. Kemp; *Tropical Medicine*, Sir William P. MacArthur; *Diseases of the Ear, Nose, and Throat*, R. G. Macbeth; *Neurology*, W. Ritchie Russell; *Diseases of Children*, Victoria Smallpeice; *Obstetrics and Gynaecology*, J. A. Stallworthy.

The Rolleston Memorial Prize for 1954 has been awarded to Dr. Anthony Clifford Allison.

UNIVERSITY OF CAMBRIDGE

Drs. G. S. Brindley and E. W. Clarke have been appointed University Demonstrators in the Department of Physiology, with tenure from October 1, 1954, for three years.

The following degrees were conferred in Congregation on May 29:

M.D.—J. D. Lever.
M.B., B.CHIR.—J. H. H. Webster (by proxy), A. E. Gibbs.
M.B.—J. D. Salmon.

In Congregation on June 26 the following degrees were conferred:

B.CHIR.—E. P. Lawrence, D. H. Mathias, P. B. C. Matthews, J. Bamforth, G. G. Carmichael, B. H. S. Dixon, K. W. Hickson, M. J. Littlewood, R. A. Owen, J. E. Trapnell, E. E. Denman, D. T. Finlay, R. K. Gilbert, A. Robinson, B. H. B. Robinson, A. S. Valentine, H. Dovey, A. Pollard, J. A. Stamford, E. Burkinshaw, R. A. Carter, D. K. Fairweather, R. S. McKim, M. A. Newland, A. O. Russell, R. M. Stirland, W. V. Agnew, M. T. Moore, P. C. W. Anderson, J. F. Bennet, D. C. L'E. Burges, T. D. Carter, R. N. Galloway, F. L. Johnstone, D. H. Jones, J. A. S. Lees, J. F. Mowbray, K. R. Oliver, M. R. K. Plaxton, J. O. Robinson, J. B. Royston, E. S. J. Samuel, P. R. Shires, J. C. S. Turner, R. S. Wardle, A. E. L. de Thierry, B. E. Farnham, C. J. Moore, J. R. C. Weatherly, R. W. Ainsworth, R. M. A. Moore, G. G. Scott-Brown, P. C. Anderson, C. B. Mortimer, R. O. Selby, R. G. D. Small, G. J. M. Thompson, S. A. Tillyard, J. F. Wood, F. E. Kenyon, K. L. G. Mills, R. W. Payne, W. D. W. Williams, J. A. Butler, R. J. Haythornthwaite, J. C. L. Rawes, J. C. Willan, J. N. Rea, G. P. Starck, J. R. Scott, J. N. Harcourt-Webster, R. D. Lowe, R. B. Jenkins, I. H. M. Veitch, J. P. English, M. Horowitz, C. A. M. Walkley, B. Woods, June P. Brady, Mary E. Budleigh, Mrs. Anne Clarke, Mrs. Elizabeth J. P. Davies, Jill M. Evans, Mary E. Hern, Irene E. McLaren, Sylvia E. Reed, Lorna M. Stauffer, Elizabeth I. Tanner, Marion Cornelius, Frances E. Garrad, Diana Ratcliffe, Bidi M. Wild, I. J. Cour-Palais.

Dr. Philip John Randle has been elected to a Research Fellowship at Sidney Sussex College.

ROYAL COLLEGE OF SURGEONS OF ENGLAND

At a meeting of the Council of the College on May 20, with Sir Cecil Wakeley, President, in the chair, diplomas of Membership were granted to the following successful candidates:

S. L. Adesuyi, L. N. Allen, T. D. Annear, Diana Austin, Jacqueline E. Banbury, L. Barsey, D. G. Bennett, A. Berry, H. R. Bissoon Dath, A. S.

Blake, Gwyneth J. D. Botherway, Angela I. Brooks, Jean Brown, D. C. L'E. Burges, Patricia Burne, P. M. C. Camm, Jean Carberry, June M. Cheetham, Brenda A. P. Clark, R. M. Clark, D. Constad, I. I. Cope, I. C. Cree, M. R. Crompton, R. N. Davis, B. Dawson, Jean E. Drake, P. Dromgoole, D. P. Duffield, Lise L. Einerl, R. A. Ellis, P. A. S. Evans, C. D. Farrier, A. S. E. Fowle, J. K. Frost, P. Garmon-Jones, Grace M. Gee, Mary H. Godwin, P. Gortval, R. A. Grande, Brenda Grant, B. W. B. Hanley, L. Harbin, L. M. Hart, D. Hide, G. M. R. Holliday, P. E. Hoogewerf, A. B. Hugo, L. H. Hurrell, W. M. Huse, I. Ingleby, Barbara M. Isles, D. C. Jackson, P. D. C. Jarman, P. Jenkins, A. R. Jones, Erica J. Jones, F. W. Jones, H. D. Jones, J. A. Kay, P. Kellett, C. E. Langham, Diana E. Lathbury, N. A. G. Leadbeater, J. E. Leaney, J. J. Lewis, D. C. Linahan, Patricia J. Lindhop, B. A. Lowe, C. Lowson, J. A. McMillan, W. M. Mee, Margaret S. Meyer, H. N. Middleton, K. F. Mole, A. A. D. Moore, Janet E. Morgan, O. Morton, Patricia E. Moul, Sheila M. Mullally, D. D. Munro, T. W. Nicholson, Wendy E. Noble, Patricia Painter, M. S. K. Palmer, A. Pearce, K. I. Pearce, Valerie J. Perkins, J. M. Phillips, C. W. Pook, D. Pownall, J. A. Purcell, J. R. Rawstron, Dorothy S. Read, Kathleen M. Reid, J. E. S. Relton, Corinne J. Richardson, D. F. Rideout, G. D. Ripley, D. Roberts, Margaret Russell, J. G. Sanderson, Count Andrew Skarbek, J. C. Smith, R. W. Smith, D. L. Smithson, B. J. Sood, V. E. R. Spence, G. P. St. C. Starck, L. Stimmler, Jane Sweatman, Eileen N. Thompson, T. M. Tibbetts, W. R. Tidy, E. E. D. Tomlin, Annie M. N. Tustin, Heather F. A. Vickery, D. Vuckovic, J. G. Wall, D. R. Whitehouse, D. H. Williams, H. R. Willings, J. H. P. Willis, A. J. Winterton, Joan M. Woodley, Celia B. M. Wookey, Enid M. Wozencroft, R. T. Yip-Choy, C. F. A. Younger, A. Youatt.

Diplomas of Fellowship of the Faculty of Anaesthetists were granted as follows:

P. C. Calvert, J. R. Bennett, K. Ll. Owen, A. F. Forbat, A. J. Heber, D. W. Clark, Bridget A. Evans, M. W. J. Grummitt, W. Norris, J. V. McDermott, B. W. Peckett, S. Pramanik, Stephanie Saville, Josephine J. Candy, D. Duncalf.

Diplomas in Tropical Medicine and Hygiene, in Child Health, and in Anaesthetics were granted, jointly with the Royal College of Physicians of London, as follows:

DIPLOMA IN TROPICAL MEDICINE AND HYGIENE.—R. M. Ajina, Evelyn C. Cummings, J. S. Dodge, N. D. Gosavi, A. E. Gunders, V. G. Nivsarker, Hla Kyaw Pe, C. E. P. Samarsinghe, S. Sen Gupta, T. K. Sweeney, S. A. Talib.

DIPLOMA IN CHILD HEALTH.—Susanne M. Salvisberg, Elizabeth C. G. Miller.

DIPLOMA IN ANAESTHETICS.—A. J. Sims.

At a meeting of the Council of the College held on June 10, the medical services of the Navy, Army, and Air Force were honoured when the Medical Directors-General attended and presented medals for meritorious work in the medical field, as follows: The Sir Gilbert Blane Medal to Surgeon Commander J. L. S. Coulter, author of *Royal Navy Medical History of the War*; the Mitchiner Medal to Brevet Colonel H. D. Chalke for his contribution in peace and war to the improvement of the health of the Army; and the Lady Cade Medal to Squadron Leader R. R. L. Pryer for outstanding work and his demonstration that intra-arterial transfusion can be applied readily to Service needs. The Blane Medal has been awarded since 1832, but this was the first award of the other two medals.

The following were co-opted to the Council for the year 1953–4 representing various branches of practice: *General Practice*, Dr. O. C. Carter; *Gynaecology and Obstetrics*, Professor A. M. Claye; *Otolaryngology*, Mr. Myles L. Formby; *Anaesthetics*, Dr. Bernard Johnson; *Ophthalmology*, Mr. A. B. Nutt; *Radiology*, Dr. E. Rohan Williams.

Professor F. C. Wilkinson was invited to act as the representative of dental surgery on the Council.

The award of the first Colyer Medal to Sir William Kelsey Fry (Eastman Dental Hospital) was reported.

Mr. D. M. E. Thomas (thoracic surgeon, of Sully, Glam.) and Mrs. Dorothy Campbell (ophthalmic surgeon, of Coventry) were admitted to the Fellowship.

The diploma of Fellow was granted to the following successful candidates:

F. L. Davies, M. J. May, H. F. McG. Bassett, A. L. T. Easton, N. C. Rees, M. J. Gilkes, W. J. Gall, F. E. Weale, A. L. Levene, I. L. Macfarlane, M. A. Brennan, W. P. W. Southwood, A. A. Eley, G. Keen, O. L. Thomas, A. G. Ackerley, Pamela M. Moody, F. H. Haine, D. S. Kaicker, A. N. Razdan, D. R. Scorgie, A. S. Dawson, J. Hirtenstein, J. S. Martin, K. M. Said M. Salvaris, P. Goldstein, G. N. Perera, E. A. M. Ryan, T. A. S. Boyd, P. F. Early, Catherine N. McRobert, C. J. Patel, P. B. Bharucha, J. L. Edmondson, P. D. Hill, N. H. Birch, B.-A. Eilenberg, J. Kirk, C. C. Patel, N. M. Souelem, T. K. Banerjee, J. D. Brosnan, J. R. Dickson, M. Kugler, M. E. Lake, T. D. H. Perera, B. H. Pickard, K. A. A. Qassab, P. R. Walpita, J. A. M. White, M. Y. A. Alyan, I. M. Cran, A. R. El Mazny, C. Galvin, J. G. Hamilton, A. B. N. Rao, J. S. Roarty, H. W. H. Shepperd, H. F. R. Story, T. P. Cannon, S. Das, M. J. Gallagher, J. E. Howson, J. F. Lee, A. McCalister, T. H. Moghul, B. Murphy, J. P. O'Neill, P. B. O'Neill, D. N. Robinson, E. F. Soothill, R. T. Todd, W. F. Walker, K. Y. M. Ansari, R. A. Bailey, S. C. Baker, A. J. Davies, J. K. Francis, F. C. Hoyte, W. J. Metcalfe, C. Miller, L. J. Opit, N. H. Porter, N. Roydhouse, H. M. Saba, L. A. Wells, T. G. Lorentz, M. Ahmad, K. K. Bhatnagar, J. H. Kettle, S. M. Singh.

A diploma of Fellowship of the Faculty of Anaesthetists was granted to Brian H. Smith.

A diploma of Membership of the College was granted to Herbert N. Baylis.

Hospitals were recognized under paragraph 23 of the F.R.C.S. regulations as follows: Heatherwood Orthopaedic Hospital, Ascot, *additional*, house-surgeon for six months. Winford Orthopaedic Hospital, Bristol, registrar for six months; two senior house-officers for six months. East Suffolk and Ipswich Hospital, Ipswich, *additional*, casualty officer for six months. The Montagu Hospital, Mexborough, surgical registrar for six months; senior house-officer for casualty and orthopaedics. The Moorgate General Hospital, Rotherham, surgical registrar for six months. Southend General Hospital, Southend, *additional*, second casualty officer. The following posts were reduced from twelve to six months' recognition: Joyce Green Hospital, Dartford, senior house-surgeon. St. Luke's Hospital, Guildford, senior house-surgeon; surgical registrar. Hull Royal Infirmary, Hull, first, second, and third house-surgeons. Woolwich Hospital, London, first house-surgeon. St. Bartholomew's Hospital, Rochester, first and second house-surgeons.

On July 1 Sir Ernest Finch, Mr. Julian Taylor, and Mr. R. P. Scott Mason were re-elected members of the Council of the College. The result of the poll was as follows:

Elected	*Votes*
Sir Ernest Frederick Finch (Royal Infirmary, Sheffield)	1,059
Julian Taylor (University College Hospital) ..	903
Robert Paul Scott Mason (Birmingham United Hospital)	768

In all 1,921 Fellows voted; in addition 17 votes were found to be invalid.

UNIVERSITY OF ST. ANDREWS

The following candidates have been approved at the examinations indicated:

M.D.—*I. C. Geddes (awarded a Rutherford silver medal), *Joan E. Perry, *A. L. Stead, J. Grieve.

CH.M.—A. P. M. Forrest (with honours and a University gold medal).

FINAL M.B., CH.B.—*R. Meadows, *K. D. Mackintosh, *R. J. L. Davidson, *Gisela B. Oppenheim, *Jean H. M. Langlands, J. R. Birkett, D. W. Blair, Elizabeth M. G. Briggs, J. Butler, J. S. Cole, P. V. Cole, Eileen M. U. Curry, J. Dalgleish, Elizabeth A. Dennis, F. R. Dickson, W. Dunn, Mrs. Judith M. Edmundson, M. A. Gilbert, Carmel Goldwater, P. Greaves, Barbara H. Hutchinson-Smith, J. J. Kay-Butler, D. B. King, B. R. Knowles, H. McTaggart, A. A. Marr, A. Mercer, E. G. Murdoch, I. H. F. Murray, I. Ogunyemi, Irene M. K. Ovenstone, J. Parr, T. A. M. Peet, G. Penny, Ruth E. E. Pocock, Helen G. Ross, Margaret I. Sadler, Sheila S. Scott, Joyce A. Shannon, G. K. M. Shaw, P. F. Slater, R. G. Small, Doreen C. Stark, J. W. W. Thomson, R. A. Truesdell, G. P. Walsh, Barbara M. Williams, Helen M. Wishart.

*With commendation.

UNIVERSITY OF GLASGOW

On June 25 the degree of M.D. was conferred on H. F. Jarvie and the degree of Ch.M. (with commendation) on H. Wapshaw.

The following degrees were conferred on July 10:

M.D.—Anne C. Aitkenhead (with high commendation), J. T. S. Brown (with commendation), R. C. Brown (with high commendation), J. K. T. Cherry, Alison M. T. Drimmie (with honours), W. J. L. Francis, C. D. T. MacLean, W. Wilson.

CH.M.—K. Fraser (with honours).

PH.D.—I A. Boyd, M.B., Ch.B., I. D. Ferguson, M.B., Ch.B., A. J. Hale, M.B., Ch.B., W. S. T. Thomson, M.B., Ch.B.

M.B., CH.B.—C. E. Anderson, A. J. Blair, M. K. Browne (with commendation), W. W. Buchanan, J. Callander, N. W. Cameron, R. Campbell, A. J. Carr, A. McC. Connell (with commendation), Sheila A. Couper, A. Craigie, J. H. Elliott, P. S. Fee, Evelyne M. T. Fisher, J. A. Gardner, F. C. Garry, A. J. Gibson, Christina McI. Hamilton, W. E. F. Lloyd, A. C. McBlane, L. P. Millar, D. C. I. Milne, I. Monteith, F. Moran (with commendation), Mary M. O'Dea, Frances K. Philips, W. B. C. Robertson, J. G. Sandeman, J. A. Scott, J. T. Stewart, A. McI. Tait, D. J. W. Taylor, Jane A. F. Taylor, J. D. Templeton, Elizabeth P. Wilson, Mary Wishart.

On June 30 the Diploma in Public Health was awarded to the following successful candidates:

R. Dickie, Margaret R. Farrell, J. E. Gallagher, J. C. Gillespie, W. Hamilton, L. H. Holroyd, Elizabeth H. Lawrie, Marjorie J. Lyon, Jean M. MacArthur, A. McClelland, Moira R. Mackie, P. Ross, P. Roughead, Elizabeth D. M. J. Thomas.

UNIVERSITY OF DUBLIN

SCHOOL OF PHYSIC, TRINITY COLLEGE

The following candidates have been approved at the examinations indicated:

M.D.—D. W. Beckett, A. Graham, O. H. Killen, V. O. McCormick, E. du P. Meiring, H. H. Robinson, L. R. Robinson.

DIPLOMA IN GYNAECOLOGY AND OBSTETRICS.—M. G. Talwar, S. M. Ahsan, G. J. Glynn, K. Somasunderam, B. P. Patel.

The following medical degrees and diploma were conferred on July 5:

M.D.—D. W. Beckett, A. Graham, O. H. Killen, V. O. McCormick, H. H. Robinson, L. R. Robinson.

M.B., B.Ch., B.A.O.—Margaret H. Allen, E. J. Arnott, J. D. Bell, Ruth V. Bewley, Marjorie L. Bowen, N. A. Burton, P. Cavanagh, R. W. Childers, E. D. Cotter, I. J. Dalrymple, A. S. Darragh, E. P. Davison, A. H. Erbergh, D. N. Golding, D. F. Hogan, J. Hyland, Margaret Image, M. A. Johnston, D. King, O. Ransome-Kuti, B. A. Lyder, R. W. McKeever, T. M. Maguire, K. C. Martin, Marien A. L. Miller, S. C. Moles, J. K. Murphy, Margaret E. K. Nelson, H. M. McC. Norman, L. A. H. Oulton, P. R. Payne, Elizabeth A. Pim, D. B. E. Quamina, A. G. Resnekov, S. F. Ryan, O. W. Samuel, Elizabeth S. M. Smith, I. D. Smyth, J. M. Stubbs, Marion G. Thomas, W. D. Thornton, T. J. Walker, Marjorie Williams, R. D. Williams, Stephanie M. Wilson, Mary A. Young.

LICENCE IN MEDICINE, IN SURGERY, AND IN OBSTETRIC SCIENCE.—M. Burack.

UNIVERSITY OF BIRMINGHAM

In Congregation on July 3 the degree of D.Sc. was conferred upon Kenneth William Donald, D.S.C., M.D., F.R.C.P., Reader in the Department of Medicine.

Professor F. A. R. Stammers has been appointed by the Ministry of Health to the Board of Governors of the United Birmingham Hospitals.

The following appointments, all from October 1, 1954, are announced: Dr. B. MacMahon, Lecturer in Social Medicine; Mr. A. L. Deacon, Mr. W. G. Mills, and Dr. Dorothy M. Shotton, Part-time Lecturers in Obstetrics and Gynaecology.

Dr. W. Brandt, Lecturer in Anatomy, will resign the appointment on September 30, 1954.

The Services

Squadron Leader I. H. Mercer, R.A.F., has been commended by the Queen for valuable services in the air.

A *Supplement* to the *London Gazette* has announced the following awards:

1st Clasp to Army Emergency Reserve Decoration.—Major R. P. Leake, R.A.M.C. (now S.S.R.C.).

Army Emergency Reserve Decoration.—Major (Honorary Lieutenant-Colonel) F. A. D'Abreu, Majors D. W. Ashcroft, P. E. Cresswell, W. R. Cunningham, R. P. Leake (now S.S.R.C.), and A. L. Williams (retired), R.A.M.C.

4th Clasp to Territorial Efficiency Decoration.—Colonel A. Swindale, C.B.E., T.D. (Honorary Colonel of a T.A. Unit).

3rd Clasp to Territorial Efficiency Decoration.—Colonel A. Swindale, C.B.E., T.D. (Honorary Colonel of a T.A. Unit). Lieutenant-Colonel P. Lloyd-Williams, O.B.E., T.D., R.A.M.C.

2nd Clasp to Territorial Efficiency Decoration.—Colonels G. W. R. Bishop, O.B.E., T.D., and A. Swindale, C.B.E., T.D., (Honorary Colonels of T.A. Units). Lieutenant-Colonel P. Lloyd-Williams, O.B.E., T.D., Major (Honorary Lieutenant-Colonel) W. L. Lamb, T.D., and Majors C. H. Johnson, T.D., and E. M. Wright, T.D., R.A.M.C.

1st Clasp to Territorial Efficiency Decoration.—Colonels G. W. R. Bishop, O.B.E., T.D., and A. Swindale, C.B.E., T.D. (Honorary Colonels of T.A. Units). Lieutenant-Colonels P. Lloyd-Williams, O.B.E., T.D., and E. H. P. Smith, T.D., Major (Honorary Lieutenant-Colonel) W. L. Lamb, T.D., and Major E. M. Wright, T.D., R.A.M.C.

Territorial Efficiency Decoration.—Colonel G. W. R. Bishop, O.B.E., T.D. (Honorary Colonel of a T.A. Unit). Lieutenant-Colonels S. T. Anning and C. J. Cellan-Jones, Major W. J. Roche (retired), Captain (Brevet Major) T. E. Hastings, M.C., and Captain (Honorary Major) J. H. Levack, R.A.M.C.

Captain D. R. Boyns, R.A.M.C., has been appointed M.B.E. (Military Division) in recognition of distinguished services in Malaya.

Captain A. Fraser-Darling, R.A.M.C., has been appointed M.B.E. (Military Division) in recognition of brave conduct in Libya on January 15–16, 1954.

The following appointments and mentions in dispatches have been announced in recognition of distinguished services in Malaya during the period July 1 to December 31, 1953.

C.B.E. (Military Division).—Colonel (Temporary) A. J. Clyne, R.A.M.C.

O.B.E. (Military Division).—Lieutenant-Colonel (Temporary) E. G. Wright, R.A.M.C.

M.B.E. (Military Division).—Captain G. T. Griffith, R.A.M.C. (now Army Emergency Reserve).

Mentioned in Dispatches.—Captains A. Litton, R.A.M.C., and T. C. Morton, R.A.M.C. (now Army Emergency Reserve).

INFECTIOUS DISEASES AND VITAL STATISTICS

Summary for British Isles for week ending **July 3** (No. 26) and corresponding week 1953.

Figures of *cases* are for the countries shown and London administrative county. Figures of *deaths* and *births* are for the 160 great towns in England and Wales (London included), London administrative county, the 17 principal towns in Scotland, the 10 principal towns in Northern Ireland, and the 14 principal towns in Eire.

A blank space denotes disease not notifiable or no return available.

The table is based on information supplied by the Registrars-General of England and Wales, Scotland, N. Ireland, and Eire, the Ministry of Health and Local Government of N. Ireland, and the Department of Health of Eire.

CASES in Countries and London	1954					1953				
	Eng. & Wales	Lond.	Scot.	N. Ire.	Eire	Eng. & Wales	Lond.	Scot.	N. Ire.	Eire
Diphtheria	20	0	5	0	1	17	4	7	0	
Dysentery	661	85	199	3		486	94	128	3	
Encephalitis, acute	6	0	0			5	1	1	0	
Enteric fever: Typhoid	4	1	0	2		6	1	2	2	
Paratyphoid	3	0	2	0		5	1	0	1	
Food-poisoning	217	34		8		241	28		0	
Infective enteritis or diarrhoea under 2 years				11	21				20	14
Measles*	3,085	94	117	217	403	7,532	207	486	259	313
Meningococcal infection	29	2	8	0	4	25	1	14	0	3
Ophthalmia neonatorum	45	1	4	0		40	3	11	0	
Pneumonia†	293	26	119	0	2	366	21	181	5	
Poliomyelitis, acute: Paralytic	35	3	11	4		51	4	6	3	1
Non-paralytic	19	1				22	1			
Puerperal fever§	243	31	1	2	1	225	37	8	1	
Scarlet fever	741	58	124	20	27	1,055	64	163	50	57
Tuberculosis: Respiratory	744	75	185	18				168	37	
Non-respiratory	126	1	28	6				23	1	
Whooping-cough	2,211	84	200	19	42	3,545	306	576	44	100

DEATHS in Great Towns	1954					1953				
	Eng. & Wales	Lond.	Scot.	N. Ire.	Eire	Eng. & Wales	Lond.	Scot.	N. Ire.	Eire
Diphtheria	0	0	0	0	0	0	0	0		0
Dysentery	0	0		0		1	0			
Encephalitis, acute		1			0		1			0
Enteric fever	0	0	0	0		0	0	0		
Infective enteritis or diarrhoea under 2 years	8	2	0	0	0	6	0	4	3	3
Influenza	3	0	0	0	0	5	2	0	0	0
Measles		0	0	0	0		0	0		1
Meningococcal infection		0	0			*	1	0		
Pneumonia	143	17	15	8	4	163	30	15	10	8
Poliomyelitis, acute	1	0			0	4	0			0
Scarlet fever		0	0	0	0		0	0		0
Tuberculosis: Respiratory	77	12	15	3	2	95	14	13	2	4
Non-respiratory		3	16	1	1		3	0	0	2
Whooping-cough	1	0	0	0	0	4	1	0	0	0
Deaths 0–1 year	202	20	21	5	7	235	34	30	7	16
Deaths (excluding stillbirths)	4,574	615	493	94	135	4,636	719	536	96	177
LIVE BIRTHS	7,876	1181	888	217	461	8,424	1134	936	249	488
STILLBIRTHS	184	23	24			203	27	20		

* Measles not notifiable in Scotland, whence returns are approximate.
† Includes primary and influenzal pneumonia.
§ Includes puerperal pyrexia.

NUMBER OF CASES

NUMBER OF CASES

Vital Statistics

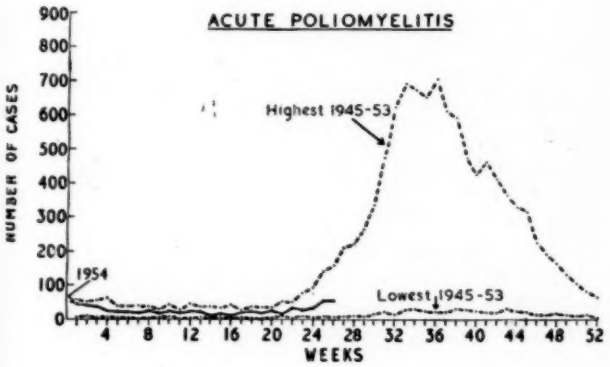
Advice on Poliomyelitis

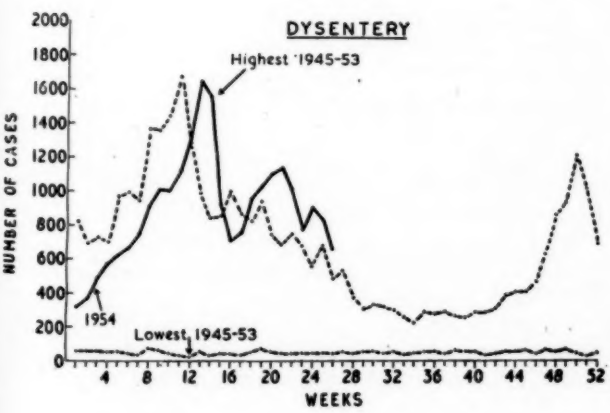
Measures to prevent the spread of poliomyelitis are recommended in a pamphlet sent this week to medical officers of health by the Ministry of Health and the Department of Health for Scotland. Transfer of the patient to hospital is preferred to nursing at home, and after the patient's removal general cleaning and airing of his room will be sufficient. He should not be allowed to return to a community of susceptible children until six weeks from the onset of the disease. Children who are intimate contacts of a case should be under "home and garden" quarantine for three weeks from the latest date of possible infection. Modified quarantine may be needed for adults. All contacts, adult as well as children, should be excluded from schools for three weeks. A school may have to be closed, though class closure may be more advisable. A residential school or camp in which a case occurs should be placed in quarantine and all visits cancelled. Gamma globulin, of which 1 pint (0.6 l.) of blood is needed to produce one dose, will be available for: (1) nurses and medical students associated with early cases; (2) babies in hospital or maternity homes who soon after birth are exposed to infection; and (3) children, especially after recent tonsillectomy, in a hospital ward where a case develops.

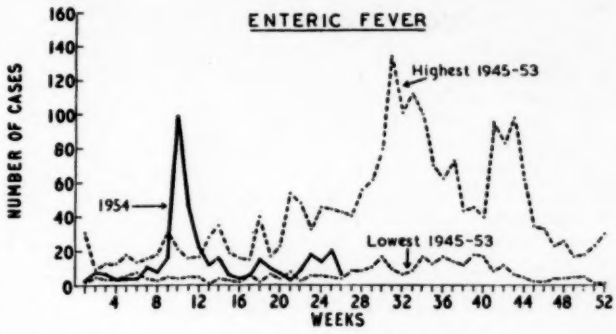
These and other prophylactic measures were discussed in a leading article in the *Journal* of July 10 (p. 92).

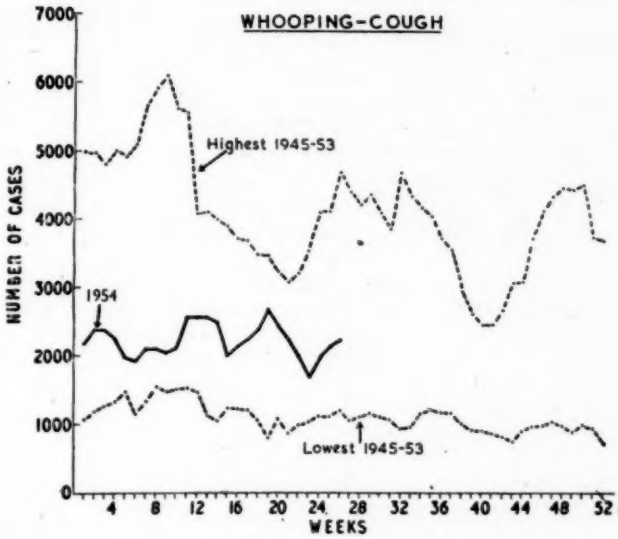
Graphs of Infectious Diseases

The graphs below show the uncorrected numbers of cases of certain diseases notified weekly in England and Wales. Highest and lowest figures reported in each week during the nine years 1945–53 are shown thus - - - - - - -, the figures for 1954 thus ———. Except for the curves showing notifications in 1954, the graphs were prepared at the Department of Medical Statistics and Epidemiology, London School of Hygiene and Tropical Medicine.









Infectious Diseases

The chief features of the returns of infectious diseases in England and Wales during the week ending July 3 were increases in the number of notifications of 249 for measles, from 2,836 to 3,085, and 99 for whooping-cough, from 2,112 to 2,211, and a decrease of 174 for dysentery, from 835 to 661.

The largest rises in the local trends of measles were 136 in Cheshire, from 218 to 354, 88 in Durham, from 240 to 328, 76 in Staffordshire, from 80 to 156, and 68 in Yorkshire West Riding, from 168 to 236, and the largest decreases were 105 in Lancashire, from 645 to 540, and 48 in Surrey, from 133 to 85. 741 cases of scarlet fever were notified, being 29 fewer than in the preceding week, and no large variations in trends were recorded. 20 cases of diphtheria were notified, being 2 more than in the preceding week. Three-quarters of the cases of diphtheria were notified in five towns—Liverpool C.B. 4, Birmingham C.B. 4, Kingston-upon-Hull C.B. 3, Seaham U.D. 2, Tipton M.B. 2. The largest variations in the returns of whooping-cough were rises of 75 in Warwickshire, from 83 to 158, and 33 in Kent, from 139 to 172, and a fall of 39 in Yorkshire West Riding, from 127 to 88.

54 cases of acute poliomyelitis were notified. These were 2 fewer for paralytic and 3 more for non-paralytic cases than in the preceding week. The largest returns were Durham 12 (Sunderland C.B. 4), Cheshire 7 (Birkenhead C.B. 6), London 4, Yorkshire West Riding 4.

The largest declines in the incidence of dysentery were 55 in Yorkshire West Riding and 45 in London. The chief centres of infection were Lancashire 124 (Manchester C.B. 29, Haydock U.D. 19, Liverpool C.B. 13, Stretford M.B. 10); Yorkshire West Riding 112 (Sheffield C.B. 37, Dewsbury C.B. 28, Leeds C.B. 17); London 85 (Islington 12, Fulham 11); Leicestershire 48 (Leicester C.B. 46); Middlesex 29 (Staines U.D. 10); Surrey 27 (Croydon C.B. 10); Berkshire 27 (Easthampstead R.D. 24); Warwickshire 22 (Birmingham C.B. 21); Lincolnshire 22 (Boston M.B. 11); Oxfordshire 20 (Oxford C.B. 16).

Enteritis Outbreak in Newborn Infants

We are indebted to Dr. D. M. MARTYN JONES, M.O.H., Isle of Man, for the following information: The small outbreak of enteritis which occurred in a maternity home in the Isle of Man last month has been shown to have been due to *Salmonella paratyphi-B* of an untypable strain. The infection was taken into the home by the mother of one of the infants, whose illness and subsequent death was the first case to be notified. Subsequent investigations revealed that twelve other babies and two mothers were also infected, but in these the illness took a mild course and no further deaths occurred.

Week Ending July 10

The notifications of infectious diseases in England and Wales during the week included: scarlet fever 807, whooping-cough 2,085, diphtheria 19, measles 2,690, acute pneumonia 248, acute poliomyelitis 65, dysentery 711, paratyphoid fever 5, and typhoid fever 3.

Medical News

Congress of Gerontologists.—The third congress of the International Association of Gerontology opened in London on July 19, under the presidency of Dr. J. H. SHELDON. A report of the proceedings will appear in next week's *Journal*.

Malaria in England and Wales.—The Ministry of Health has drawn attention to the rising number of malaria notifications in England and Wales. In 1951 there were 177 notifications, in 1952 388, and last year 559. Most of the cases occurred in members of the Armed Forces who had recently returned from the Far East, but in 1953 there were two indigenous cases, both in South London. It is therefore particularly important that all cases of malaria, whether primary or relapses, should receive radical treatment (see "Recommendations on the Use of Malarial Drugs" *British Medical Journal*, July 17, p. 148, and correction on p. 258 of this issue). Prompt treatment will minimize the chance of further indigenous outbreaks in places where anopheline mosquitoes still breed. Senior administrative medical officers of regional boards have been asked to facilitate the admission of malaria cases to suitable hospitals, and public health laboratories will examine, free of charge, suspected malaria blood-films sent by general practitioners.

The Royal Medico-Psychological Association held its annual dinner at the Apothecaries' Hall, London, on July 14, with the new president, Dr. NOEL HARRIS, in the chair. Proposing the toast of the guests in an amusing speech, Dr. HENRY YELLOWLEES observed that the character of the association seemed to have changed in recent years. He had known the days when meetings were less scientific than now—but the spirit of hospitality and conviviality remained the same. Replying to the toast, Sir CECIL WAKELEY, who is Senior Warden of the Worshipful Society of Apothecaries, drew particular attention to the magnificent hall in which the diners sat. It had been damaged during the war and a large sum had been spent on it during the last year, he said. They felt it was well worth while to keep the traditions of the City of London alive. Giving the toast of the Royal Medico-Psychological Association, Professor B. W. WINDEYER, Dean of the Middlesex Hospital, gave a special welcome to the members of the association who were holding their meeting at the hospital. Recalling the achievements of some of its former presidents, among them Sir Charles Hastings, the founder of the B.M.A., he wished the new president a year of happiness and success. Dr. NOEL HARRIS replied, emphasizing the help he had received from his colleagues at the Middlesex Hospital and elsewhere. A happily contrived adornment to the evening's festivities was the singing of madrigals by the Cavendish Singers in a gallery at one end of the hall.

The Proceedings of the first World Conference on Medical Education will be published in October of this year at the price of £3. The conference, of which Sir LIONEL WHITBY was president, was held in London in August, 1953, under the auspices of the World Medical Association.

New Out-patient Department at Great Ormond Street.—This week the new out-patient department of the Hospital for Sick Children, Great Ormond Street, was in use for the first time. It will cater for some 300 sick children and babies daily on an appointment system. The new building is designed to make attending hospital easier and pleasanter for the children and their mothers and also to provide better facilities for the staff. Hospital receptionists will receive the patients, prevent delay, and allay anxieties. An internal telephone system connects with dictating machines in the basement so that medical staff can dictate their notes and letters immediately. The whole department is planned for easy maintenance. Floors are fitted with automatic sprayers for cleansing; a slight tilt allows the water to drain away quickly, and heating panels near the floor deal with any residual moisture.

Home for the Deaf.—On July 19 the ARCHBISHOP OF CANTERBURY opened a new residential home for the deaf at Canterbury—Roper House. The property has been acquired by the National Institute for the Deaf as a home for necessitous deaf persons living in the area of the South-east Regional Association for the Deaf. It will cater for 30 residents of both sexes. A small maintenance charge will be made. Inquiries about the home and applications for admission should be made to the secretary, the National Institute for the Deaf, 105, Gower Street, London, W.C.1.

Greater London's First Smokeless Zone.—The Minister of Housing and Local Government has confirmed an Order by Tottenham Corporation to make the war-damaged Markfield area a smokeless zone. The fact that there is much rebuilding to be done there will make the Order easier to apply.

Ciba Foundation to Support Research on Ageing.—The Trustees announce that the Foundation will provide annual awards for outstanding experimental work on the basic problems of ageing. For the first year there will be five awards valued at £300 each. Grants for travelling fellowships will also be made from time to time. In addition the Foundation is planning a series of conferences on gerontology, the first of which was held earlier this month, and the proceedings will be published in volumes similar to those recording the "Colloquia on Endocrinology."

Sir Jack Drummond Memorial.—The appeal closed on July 17, when over £30,000 had been collected. The money will be used to endow a research fellowship in nutrition.

Speech Therapists' Register.—A new edition, revised up to May 28 of this year, has been published by the Board of Registration of Medical Auxiliaries. Copies are available to members of the medical profession, free of charge, from the Registrar of the Board, B.M.A. House, Tavistock Square, London, W.C.1.

Chartered Society of Physiotherapy.—Sir HAROLD BOLDERO has been elected chairman of the council in succession to Professor J. WHILLIS.

Mr. Geoffrey Keynes received the honorary LL.D. of Edinburgh University on July 8.

Sir Wilson Jameson, formerly chief medical officer of the Ministry of Health, received the honorary LL.D. at the summer graduation ceremony of Queen's University, Belfast.

Wing Commander D. Stevenson has been appointed an Officer (Brother) in the Venerable Order of the Hospital of St. John of Jerusalem.

Dr. C. J. Hackett, recently director of the Wellcome Museum of Medical Sciences, has taken up an appointment as medical officer in the Division of Communicable Disease Services of the World Health Organization.

COMING EVENTS

Hospitals' Symphony Orchestra.—Concert at 7.30 p.m. on July 24 in the Library, St. Mary's Hospital Medical School, London. Inquiries to Nancy Watts, MONarch 2319.

Filarial Blindness in West Africa.—Dr. F. C. RODGER, director of the West African Survey of the British Empire Society for the Blind, is giving a 20-minute broadcast talk on the Third Programme on Thursday, July 29, at 7.5 p.m. (repeated at 10.45 p.m. on Friday, July 30).

First International Congress of World Federation of Occupational Therapists.—In Edinburgh, August 16 to 21. Details from Congress Secretary, Astley Ainslie Hospital, Grange Loan, Edinburgh, 9.

Conference on Welfare of Spastics.—At B.M.A. House, London, September 28–30. Details from Secretary, British Council, 13, Suffolk Street, London, S.W.1.

Summer School on "Criminal Responsibility."—At St. Hugh's College, Oxford, during September. Details from Secretary, Institute for the Study of Delinquency, 8, Bourdon Street, Davies Street, London, W.1.

SOCIETIES AND LECTURES

A fee is charged or a ticket is required for attending lectures marked ●. Application should be made first to the institution concerned.

Friday, July 30

EDINBURGH UNIVERSITY.—At Biochemistry Theatre, 5 p.m., Dr. John W. Gofman (University of California): Pathogenesis of Atherosclerosis with Reference to the Metabolic and Hormonal Aspects of Serum Lipoproteins.

APPOINTMENTS

MANCHESTER REGIONAL HOSPITAL BOARD.—K. S. Daber, M.B., Ch.B., D.C.P., Additional Consultant Pathologist, West Manchester Hospitals; J. Brown, M.B., Ch.B., D.M.R.D., Consultant Radiologist, Lancaster and Kendal Hospitals; F. L. Robertshaw, M.B., Ch.B., D.A.R.C.S., Additional Consultant Anaesthetist, West Manchester Hospital Centre; N. E. Rankin, M.B., B.S., Assistant Pathologist, Hope Hospital, Salford; N. C. Scott, M.B., Ch.B., F.R.C.S.Ed., Assistant Chest Physician and Deputy Physician Superintendent, High Carley Sanatorium, Ulverston; H. D. Penney, F.D.R. R.C.S., Senior Hospital Dental Officer, South Manchester Hospital Centre.

SOUTH-WESTERN REGIONAL HOSPITAL BOARD.—Phyllis Poyner-Wall, M.B., B.S., D.C.H., Deputy Resident Physician, Winsley Chest Hospital, near Bath; R. H. Armin, M.B., B.Chir., D.P.M., Consultant Psychiatrist and Deputy Physician Superintendent, Mendip Hospital, Wells, Somerset; H. S. Bennett, M.B., Ch.B., D.M.R.D., Consultant Radiologist, West Cornwall Clinical Area; J. S. Ruddell, M.D., D.A., Consultant Anaesthetist, North Gloucestershire Clinical Area; D. M. Stevens, M.B., F.R.C.S.Ed., D.L.O., Consultant E.N.T. Surgeon, Bath Clinical Area; H. Greenburgh, M.D., M.R.C.P., Consultant Pathologist, Plymouth Clinical Area.

BIRTHS, MARRIAGES, AND DEATHS

BIRTHS

Bailey.—On July 13, 1954, at the Plot House, Sonning-on-Thames, Berks, to Nancy, wife of Dr. Grenfell Bailey, a son—James Parnwell.

Diggory.—On July 15, 1954, to Patricia, wife of Dr. Peter Diggory, of 14, London Street, London, W., a son—Paul.

Robinson.—On July 13, 1954, at Middlesbrough Maternity Hospital, to Winifred, wife of Dr. L. W. Robinson, a son.

DEATHS

Burger.—On July 17, 1954, at 23, Mapesbury Road, London, N.W., Oskar Burger, M.D.

Enraght.—On July 16, 1954, William Enraght, M.R.C.S., L.R.C.P., of Etchinghill, Folkestone, Kent.

Friel.—On July 17, 1954, Sophia Seekings Friel, M.D., D.P.H., of Sidmouth, Devon, formerly of Highgate, London, N.

Hiddleston.—On July 12, 1954, at Hawick, Roxburghshire, John Murray Hiddleston, L.R.C.P.&S.Ed., L.R.F.P.S.

McLaren.—On July 16, 1954, in a nursing-home, Edinburgh, John McLaren, M.B., C.M., of 39, Lauriston Place, Edinburgh, aged 89.

Martin.—On July 14, 1954, at his home, 133, Lowther Road, Bournemouth, Hants, William Martin, F.R.C.S.Ed., late of Southsea.

Newsome.—On July 13, 1954, at 99, Pembroke Road, Clifton, Bristol, Herbert Newsome, M.B., B.S., aged 86.

Parker.—On July 13, 1954, at Malton Cottage Hospital, Yorks, Alexandrina Murray Milroy Parker, M.B., Ch.B., D.P.H., D.T.M.&H., late of Knock, Whithorn, Wigtownshire.

Any Questions?

Toxic Effects of Proguanil

Q.—*What acute and chronic toxic effects has proguanil, particularly in children?*

A.—In doses recommended for prophylaxis or suppression, proguanil has no serious side-effects. There may be some trivial gastro-intestinal disturbances after the first few doses, but these do not persist.

Gastro-intestinal disturbances, including nausea and vomiting, and haematuria may occur after heavy dosage with proguanil. No ill effects are observed on recommended therapeutic doses.

Nocturnal Epilepsy and Driving

Q.—*A patient, aged 21, has suffered from nocturnal epilepsy for 18 months. He has never had a fit by day. When on night shift, the attacks occurred during his daytime sleep. Electroencephalography shows a record outside normal limits and suggesting epilepsy. He has phenobarbitone in the evening, and has had no attack for two months. His great hobby is motor-cycling. Should he be advised against driving a motor vehicle?*

A.—The association of epilepsy with sleep may appear in some individuals to be constant, at any rate over very long periods, but close inquiry will sometimes reveal the occurrence of minor seizures during the day. Freedom from seizures for two months is of little value in prognosis. The patient should certainly be advised against driving a motor vehicle, and in filling up the application for a driving licence should be advised that he must answer yes to the question about epilepsy.

Appointment of a Receiver

Q.—*I am treating an elderly patient who suffers from marked atheroma and general senility to such an extent that she is unable to manage her affairs. Her solicitors have written to me, sending a medical affidavit for me to fill in and sign, since her bank requires a receiver to be appointed for her. Am I acting wisely if I do this, or do I lay myself open to any subsequent legal complication? Incidentally, I always understood that two medical certificates by entirely independent doctors are required in these cases. Is this correct?*

A.—There is no relationship between the certification of a patient as of unsound mind and the appointment of a receiver. Certification may require two certificates, but only one medical affidavit is necessary in connexion with a receivership. Under Section 116 of the Lunacy Act of 1890, orders may be made by the Court of Protection for the appointment of a receiver of the income of a patient in six classes of case. The fourth class, which is clearly appropriate in this instance, is any person not detained and not found of unsound mind by inquisition but being through mental infirmity, arising from disease or age, incapable of managing his affairs.

No proof of unsoundness of mind is necessary. The medical affidavit is designed simply to show why the patient is incapable of managing his affairs, and it is undesirable that the affidavit should go beyond the purposes of the statute. The Court of Protection is a very cautious body in these matters, and the inquirer need have no apprehension about giving information which he believes to be accurate and fair. It is, of course, open to the patient to allege that the affidavit is a false one; but, provided that the doctor is not in doubt about its truth, he should not be restrained from making it on that account. It is on the other hand his professional duty to make such an affidavit in a proper case, since its effect may be to save an elderly lady from wasting her estate or from putting it into the hands of unsuitable people.

Trichomonal Balanitis

Q.—*Ten days after extramarital exposure a patient was seen with a copious purulent discharge from, and marked inflammation of, the glans and prepuce. There was no frequency, little dysuria, and no urethral discharge. Microscopic examination showed secondary invaders, no gonococci, and was positive for trichomonas. A repeat examination on the following day gave the same result. Wassermann reaction was negative. The patient's wife was found also to have a vaginal discharge which was positive for trichomonas. Treatment has consisted in giving 2 million units of procaine penicillin and 15 g. "sulphatriad" with saline baths. This has cleared up the secondary invaders, but small ulcers persist on the glans and on the inner surface of the foreskin. He is uncircumcised, but the foreskin is easily retractable. As I believe this condition is resistant to treatment and inclined to be chronic, I would welcome your suggestions on what course I should adopt.*

A.—In view of the fact that the patient suffers from slight dysuria there should be an examination before the first morning micturition and bath to ascertain whether there is an associated urethritis. However mild this may be, it might well indicate the presence of *Trichomonas vaginalis*. This protozoon is nowadays not uncommonly the cause of urethritis in the male. Infection of para-urethral ducts can also cause resistant infection in both male and female and should be specially looked for.

Though the penetration of tissue in some genital infections by *Entamoeba histolytica* has been demonstrated, no one, so far as the writer knows, has succeeded in doing so in the case of *T. vaginalis*. However, a biopsy of one of the small ulcers might show the latter to be present. For this circumcision alone would suffice (it would also help in treatment) and there could then be an examination of ulcers of prepuce.

Treatment suggested is the application in powder form of aureomycin, terramycin, or acetarsol. The glans and prepuce should be bathed three times daily in warm saline and dried thoroughly before the application of whichever powder is selected.

Psychiatrist and Psychotherapist

Q.—*What distinction is there between a psychiatrist and a psychotherapist? Is a specialized training required in order to become a psychotherapist? If so, are there "recognized" centres, how long is the training, and what does it consist in?*

A.—The term psychiatrist is now used when referring to the medically qualified who have obtained further education in the diagnosis and treatment of mental illness in adults and children.

The term psychotherapy is generally applied to all those methods of psychiatric treatment of mental illness in children and adults, whether mild or severe, in which personal contact alone is exploited—although the term is also sometimes applied to those types of personal contact in which consciousness is modified by hypnosis or drug. Not all psychotherapists are medically qualified. As yet in this country there is no Ministerial or academic sponsorship for the education of non-medical persons in psychotherapy, regardless of their academic qualifications in, for instance, psychology or education. "Recognized" training in many types of psychotherapy is part of general psychiatric education in all postgraduate centres, but the intensity of such training varies greatly from centre to centre. Training, whether in an academic centre for medical graduates or in one of the other organizations where both medical graduates and other adequately qualified persons are trained, in general consists in

(*a*) some method to increase the student's understanding of his own development and of his own personal reaction to other people's difficulties, as it is he himself who will be both observer and operator in the psychotherapeutic situation;

(*b*) a series of lectures and seminars on the history and present status of psychotherapeutic methods; and

(*c*) supervision of the student's first attempts to apply to patients the methods he has been studying.

The length of training (part-time for from two to five years) depends upon its type. The best summary of facilities available in this country is one compiled on behalf of the British Psychological Society, B.M.A. House, Tavistock Square, London, W.C.1—*Careers in Psychology* (price 6d.). Details of the various courses are also given each year in the educational number of the *Journal*.

Inheritance of Spina Bifida

Q.—*A young couple's first child had a spina bifida, and died after one or two months. So far as can be ascertained there is no family history of this condition on either side. What chance is there of this occurring in a further pregnancy? Would it be worth while having either parent radiographed for evidence of spina bifida occulta?*

A.—Following the birth of a child with spina bifida, the chance that any subsequent child will be similarly affected (including the chance of some other serious malformation—for example, anencephaly) is greater than in a random pregnancy. Nevertheless, the risk is a small one, perhaps about 1 in 30. It is not a big chance compared with the inevitable risk that any pregnancy will result in a child suffering from some serious malformation or other, and this couple should not feel deterred from having another child.

The genetics of spina bifida in the human are obscure. There is doubtless some measure of hereditary predisposition, but other and at present unknown factors must be considerably more influential. The parents would probably prove normal on *x*-ray examination; even should one or other have spina bifida occulta, its discovery would be of little help in assessing the chances for subsequent children.

Correction.—We much regret that a line was unfortunately omitted from the "Recommendations on the Use of Antimalarial Drugs" prepared by the Colonial Medical Research Committee's Malaria Subcommittee (*Journal*, July 17, p. 148). Col. 2, line 14, on p. 149 should have read "*Emergency Treatment.*—(i) *Quinine dihydrochloride*," and not "necessary. Or (iii) *Chloroquine salts*. The *hydrochloride*." The paragraph in question, which appears under the heading "Suggested Dosage: Treatment of the Overt Attack," should therefore read:

Emergency Treatment.—(i) *Quinine dihydrochloride*, 650 mg. (10 gr.) in sterile normal saline injected intravenously and repeated in six hours if necessary. Not more than three injections should be given within 24 hours. Distilled water can be used as a solvent if the volume does not exceed 10 to 15 ml. It is imperative that quinine be injected slowly, at a rate not exceeding one grain per minute. Or (ii) *Mepacrine methane sulphonate*, 375 mg., or *mepacrine hydrochloride*, 300 mg., intramuscularly, repeated in six hours if necessary. Or (iii) *Chloroquine salts*. The *hydrochloride* is given intramuscularly in dosage of 200 to 300 mg. of base (supplied in ampoules in aqueous solution), repeated in six hours if necessary, and intravenously, 400 mg. of base in 500 ml. normal saline by intravenous drip over a period of one hour. The *sulphate* supplied in 5 ml. ampoules (40 mg. base to 1 ml.) is given in dosage of 200 mg. base intravenously, repeated after eight hours if necessary.

We have been asked to state that Major-General Sir John Taylor was secretary of the Malaria Subcommittee during most of the period when the report on malaria drugs was being prepared.

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